The
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Smoke Prevention

AS a man consumes about seven times as much air daily as he does food and drink, and requires ultra-violet rays from the sun to keep him in health, correct diagnosis of the causes of atmospheric pollution is of much more than academic interest.

In Manchester three million tons of coal are consumed annually, according to particulars given within the past few years by Dr. Taylor, of the Health Department. This is more than eight times the quantity required for the electricity undertaking, which makes a negligible addition towards the annual deposit on the city area of 20,000 tons of solid matter, 75,000 gallons of tar, and 200,000 gallons of acids.

The domestic hearth, which burns one-quarter of the above total, is mainly responsible for the smudged sky, due to the low efficiency and wide dispersion of the products of combustion.

Yet in any industrial district can be found evidence of the heavy contribution made by manufacturing processes. On the banks of the Thames near Chelsea, for instance, offending chimneys prove how far off is electrical saturation in motive power; but they also serve, by contrast, to emphasise the virtues of electric generating stations.

The new Battersea station was designed to fulfil stringent conditions and might be expected to be a model, but Lots Road, on the opposite bank, is a good example of the inoffensiveness of a relatively old station. The height of its main chimneys indicate the foresight of its designers in anticipating by nearly thirty years the recommendations of the Taite Committee, which had been previously met on another point by the installation of cyclone extractors that were approved by the L.C.C. as solving the problem of grit emission.

Little of the volatile constituents of the fuel can be wasted in fouling the stacks when a thermal efficiency of 21.15 per cent. is attained with steam conditions of 375 lb. per sq. in. and 750 deg. F., and we believe this figure has been improved upon since the publication of the last fuel returns of the Electricity Commissioners.

Recently we watched the load on the Underground Railways rise from 50,000 kW to 105,000 kW in a little over an hour with negligible increase in the small amount of smoke perceptible.

Meanwhile in the neighbourhood a gasworks was emitting varied-hued discharges from short chimneys, as well as smells; one factory chimney, in particular, was belching forth a sooty column, and several others were doing so less conspicuously; refuse from the riverside dump of an adjoining borough was being blown to all quarters, whereas at the power-station the ashes are washed.

It was at one time difficult to judge what constituted a smoke nuisance, but the development of light-sensitive apparatus has furnished us with an objective standard.

Prevention, however, is better than cure; the burning of coal in large generating stations, the owners of which can afford to install the plant and to maintain a specialised staff to control combustion on scientific lines, provides the most substantial help towards clearing the air that is likely to be offered.

Distribution Expenditure

WHEN distribution questions are so much under discussion it may be of interest to quote figures from a few recent balance-sheets of electricity supply companies relating to present-day capital outlay. The County of London Company made a net capital expenditure of £1,161,000 during 1934, £704,000 of which was for "mains, including cost of laying"; the transmission and distribution network was increased by 450 miles of underground and overhead lines, and 108 transforming stations were added. The North Eastern Electric Supply Co., out of £373,248 new capital outlay, spent £273,754 on "mains, including cost of laying." Meters cost the County Co. £98,591, and the North Eastern £42,644. The North

Metropolitan Electric Power Supply Co.'s capital expenditure for the year figures out at £780,748, of which a very substantial part was for distributing mains and sub-stations; 218 miles of underground mains were laid, 24 miles of overhead lines were erected, and twenty additional villages are receiving supplies. To quote a fourth example, we may refer to the Westminster Company, which, out of a total capital expenditure of £128,906 last year, spent £75,625 on mains and £19,122 on meters and their calibration.

Two Board Appointments

THE appointment of Mr. J. W. Beauchamp to be commercial manager to the Central Electricity Board is a matter for congratulation both to the Board and to Mr. Beauchamp himself, as well as affording grounds for satisfaction to the electricity supply industry. Had the responsibility for selecting the right man for this particular job rested with us we think we could not have made a better choice. Mr. J. T. H. Legge, whose progressive record, together with that of Mr. Beauchamp, is mentioned in our "Personal" pages to-day, will succeed the latter gentleman as the Central Board's district manager for South-West England and South Wales. The Board will be the stronger for these changes in the positions of two men of energy, enterprise and foresight.

We Want £10,000!

MANY letters have reached us as a result of our recent leading article on "The Man Without a Job," but we have not yet heard the name of a generous donor who is going to offer a good round sum to the Electrical Industries Benevolent Association as a challenge to everybody else. Not the least helpful communication received is that from Captain Keeping appearing in our "Correspondence" pages to-day. We hope our readers will spare a little thought for his statement descriptive of a few pathetic cases such as are continuously being helped by the organisation. We leave them to make their own eloquent appeal. It will be the event of our lives if somebody will make us the channel for passing £10,000 to the funds in this Jubilee year!

Harmony in Birmingham

BIRMINGHAM is renowned for its very live civic spirit; many of its ideas have been copied by cities in all parts of the world. It is evident at the annual dinners of the Birmingham Electric Club, the twenty-fourth of which was held last Friday, that this spirit has permeated the electrical industry of the city. The Lord Mayor spoke no more than the truth when he said that electricity and the electrical industry were most important factors in the life of the city. With its 400 members the Club justly claims to be the largest body of its kind in the country. It embraces representatives of all the various branches of the industry—manufacturing, contracting, supply, telephone, etc., and apart from its social activities it holds meetings for the interchange of ideas and experiences. The Club is now embarking upon measures to encourage technical education and to advise aspirants as to their prospects. Further, it aims at assisting members who fall out of employment to secure positions. By these means it attains a degree of co-operation which we would like to see more widely spread throughout our industry.

A Possible Menace

AT the annual dinner of the Electrical Wholesalers' Federation last week the president (Mr. J. F. Irvine) expressed the members' consternation at the growing amount of electrical business which was getting into the hands of non-electrical concerns—both wholesale and retail. He put the figure at the colossal total of 156,000, of which 6,000 were wholesale firms. He did not indicate how much of the electrical business was going to firms outside the industry, but we should imagine that a great many of these deal in nothing more than lamps. And, after all, the electric lamp is now such a common necessity of life that it is hard to restrict its handling to electrical traders. Gas consumers can get mantles at all sorts of shops, and users of electric lamps want to be able to do the same. When, however, other appliances come into the picture, the case is quite different. Electrical sales should mean electrical service. Without that electricity is likely to be brought into disrepute. Therefore, in co-operation, the electrical industry should drum into the public by all possible means the fact that they, and they alone, stand behind the goods they sell.

Electrical Engineering Scholarships

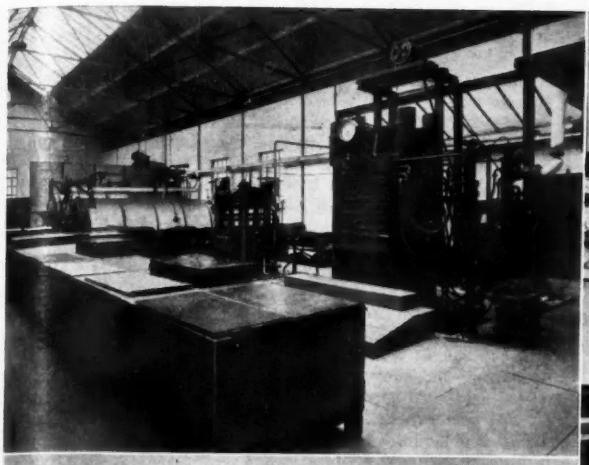
IT is good to see a son carrying on the calling of his father. It denotes a faith in the future of his profession by the older man and provides the younger with an environment and with a tradition to live up to—and improve upon if he can. The Institution of Electrical Engineers in awarding the Duddell and Ferranti Scholarships gives preference to those whose fathers have played a part in building up the industry. A territorial basis also has its merits in fostering the legitimate aspiration of a youth to become worthy of the best that his town has produced, and that is the bias given, in favour of Sunderland, by the Swan Memorial. These three scholarships are intended to permit the college-trained student to take further advantage of his special opportunities, but the Silvanus Thompson Scholarship is no less important, as it is designed to open up a technical career to those who have already done as much as they can to develop their native originality and skill in spite of the handicap of straitened means. Application should be made by prospective candidates within the next month.

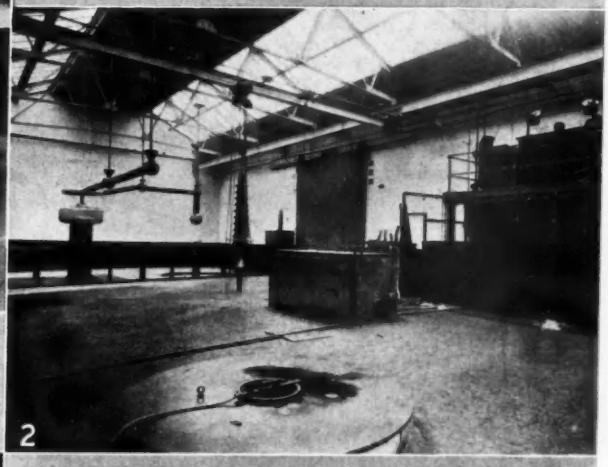
Application Forms

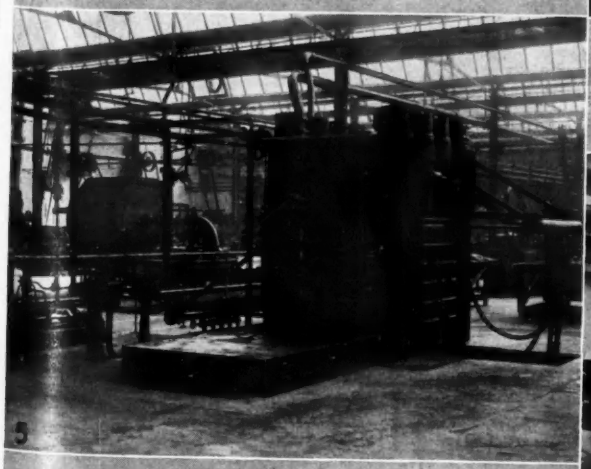
AN undertaking is entitled to require a consumer to state the "maximum power" required for his installation and to give a month's notice before exceeding the stated amount. Is it necessary, however, to alarm him at the outset by demanding so elaborate a return on his application form as is common? There is an air of finality about it that inhibits the will to extend. There is usually margin enough on the service apparatus to cope with the extensions which experience of change-overs show will be made without official notification (and which makes of doubtful value the meticulous returns of kW connected that are often prepared). The potential consumer is also apt to be frightened by the array of legal matter to be found on the back of some application forms, especially as he does not see the document again after he has signed on the dotted line. It should, surely, be enough to state that the supply is given in accordance with the Acts (general and local) and Orders, and to leave with the consumer a simply expressed summary of his obligations.

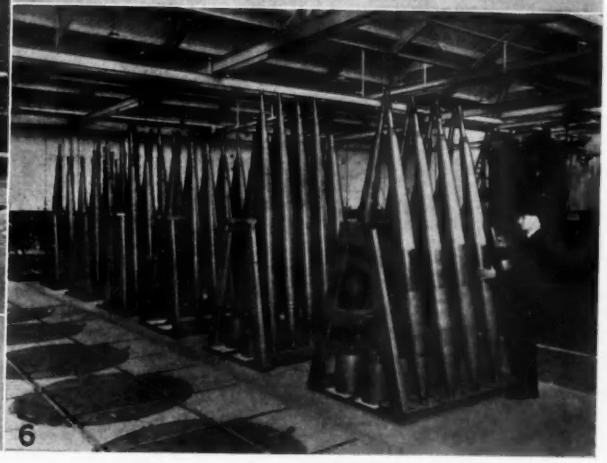
Liverpool Street Station

WHILE a comprehensive scheme of electrification of our main lines may not be feasible at the moment, much can be done to improve suburban traffic conditions in this way. There is a danger lest a comparison of the two aspects should hold up electrification where the more immediate advantages are to be realised. An important part of the case for electricity in congested areas rests upon the possibility it presents of running a greater number of trains in a given time. Mr. W. C. P. Tapper stated at the annual general meeting of the L.N.E.R. that the Liverpool Street system must be almost unique in its promise of a remunerative conversion, and pointed out that the arguments against it could have been adduced against the large schemes of the Southern Railway. Sir Philip Dawson, in a letter to *The Times*, has expressed the view that electrification of the Southend railway would prove as successful as that of the Brighton line. We see no reason to justify the attitude of the L.N.E.R. in the face of the Southern's example.









Sections of a Walthamstow Insulation Factory. **(See page 378)**

1. The "Paxolin" board shop where bakelite-bonded paper and fabric materials are made. 2. The 500,000-V laboratory. 3. Part of the inspection department. 4. The bushing finishing section. 5. A 4,000-ton press. 6. H.v. bushings

Cadmium-Copper for Overhead Lines. By G. W. Preston

Mechanical and electrical properties

DURING the past few years cadmium-copper has proved to be an excellent material for electrical purposes, and its range of uses has increased considerably. Its virtues as an overhead transmission line conductor material, however, are not always fully appreciated.

Of all the metals, except silver, copper has the highest electrical conductivity, and this characteristic together with satisfactory mechanical properties renders it eminently suitable as a conductor material. For some purposes, however, such as for overhead-line conductors, which have to be erected with a high mechanical tension, the tensile strength of pure copper is not always adequate. Pure annealed copper which has not been work-hardened to any great extent before being annealed has an ultimate tensile strength of about 14 tons per sq. in., but by means of subsequent cold working (*i.e.*, rolling and drawing) this strength may be raised to approximately 30 tons per sq. in. Even so, it is often insufficient to enable a long span construction to be adopted without unduly increasing the height of the supporting structures to provide adequate ground clearance.

Mr. G. W. Preston, A.M.I.E.E., has been electrical engineer to the Copper Development Association since its formation in 1933

The tensile strength of copper can be increased by the addition of a small proportion of other metals, but only at the expense of a decrease in conductivity. The minutest quantities of some impurities in copper have a remarkable effect upon this latter quality; for instance, the addition of only about 0.1 per cent. of phosphorous will reduce the conductivity to nearly half, while the addition of 1.0 per cent. of tin, though increasing the tensile strength by about 50 per cent., with severe cold working, reduces the conductivity by about the same amount. By the addition of certain other metals, such as beryllium, the mechanical properties of copper may be so improved that they are comparable with those of high-grade steel. Copper containing only 2.5 per cent. of beryllium when heat treated can be given a tensile strength as high as 80 tons per sq. in. with a Brinell hardness of over 400, but the conductivity of the alloy is low when compared with that of pure copper.

The addition of cadmium to copper, while markedly improving its mechanical properties, reduces its conductivity less than does the addition of other metals producing a similar mechanical effect. Cadmium is a white metal somewhat similar to zinc.; its specific gravity approximates to that of copper and it has an ultimate tensile strength of about 4 to 5 tons per sq. in. and an electrical conductivity of about 25 per cent. of that of pure copper.

Although the ultimate tensile strength of cadmium is not much more than one third that of copper, the addition of a small proportion is capable of raising the ultimate tensile strength of copper by about 50 per cent., with a reduction in electrical conductivity of the metal in the work-hardened condition of not more than 15 per cent.

By adjusting the cadmium content and the degree of cold working, cadmium-copper wires having a wide range of electrical and mechanical properties can be obtained. With the addition of only 0.9 per cent. of cadmium smaller sizes of wires can be produced with a tensile strength of approximately 45 tons per sq. in. and an electrical conductivity of about 85 per cent. of the I.E.C. standard for annealed copper, although a slightly lower tensile strength is more usual with this conductivity.

For telegraph and telephone lines cadmium-copper wires having a tensile strength of approximately 45 tons per sq. in. and a conductivity of about 82 per cent. of that of annealed copper are commonly used, while for trolley wires, which are of comparatively large diameter, the minimum tensile strength is usually about 28 tons per sq. in. with a conductivity of about 89 per cent., although it is possible to obtain such wires with a tensile strength as high as 40 tons per sq. in. and a slightly lower conductivity.

For the manufacture of cadmium-copper only copper of the highest purity is used, from which the major portion of the normal oxygen content is removed by the addition of suitable deoxidants before the cadmium is added. A master alloy is first prepared which usually contains about equal parts of cadmium and copper. Suitable quantities of this alloy are then added to the copper in the molten state; the cadmium goes immediately into solution and the alloy is cast into wire bars of suitable shape and size in vertical moulds, after which it is rolled and drawn into wire in the usual way.

There can be little doubt that, for high-tensile overhead-line conductors, cadmium-copper, manufactured as it is to-day under accurately controlled conditions, has the best combination of electrical and mechanical characteristics of any material yet produced. For such purposes, the alloy usually contains about 0.8 per cent. to 1 per cent. of cadmium. Its fatigue strength, which within limits increases with increasing cadmium content, is superior to that of most other high conductivity metals and alloys, and it is for this reason that cadmium-copper has been used successfully for purposes other than overhead lines where fatigue resisting properties are required, such as for flexible telephone cords. Since cadmium-copper has been introduced a life test can be applied to such cords about twenty times as severe as that formerly possible.

In fatigue tests carried out on a Haigh machine in which rapidly alternating loads are applied to the test specimen while it is carrying a tensile load, the range of stress to produce failure of cadmium-copper is frequently more than 25 per cent. greater than that required with hard-drawn copper. When subjected to an impact test of the Izod or Charpy type cadmium-copper also gives appreciably superior results, which shows that it is in no way brittle, but is in fact superior to ordinary copper in this respect. Cadmium-copper is harder than ordinary copper and has a higher annealing temperature, which within limits increases with increasing cadmium content. It is on account of these properties that it is used for such purposes as the electrodes of welding machines. These characteristics are also of importance in overhead-line conductors since the greater hardness of the alloy renders them less liable to damage during transit and erection, while the higher annealing temperature, combined with good thermal conductivity and a high melting temperature compared with that of materials such as aluminium, ensures a minimum of damage to the conductors by flash-overs at insulators or by span contact.

As a high-tensile conductor, a cadmium-copper cable, although slightly more costly at present, is superior to those of the composite type built up from materials varying widely in electrical and mechanical characteristics. A cadmium-copper conductor is homogeneous and, being constructed throughout of the same corrosion-resisting material, its behaviour in service can be more accurately determined than can that of a composite conductor.

Characteristics of a Typical Conductor

In the accompanying table some details of a typical cadmium-copper conductor, a hard-drawn copper conductor and a normal type of steel-cored aluminium conductor are compared. The cadmium-copper and the s.c.a. conductors are assumed to be erected at the same maximum working tension, the factor of safety being slightly higher for the cadmium-copper than for the s.c.a.

	1 Hard-drawn copper.	2 Cadmium-copper.	3 Steel-cored aluminium.
Equivalent copper section, sq. in.	0.1 sq. in.	0.1 sq. in.	0.1 sq. in.
Stranding	7/.136	7/.146	7/.173–7/.076
Overall diameter, in.	0.408	0.438	0.574
Ultimate tensile strength, lb.	5,870	9,440	9,270
Assumed Max. working tension, lb.	2,935	4,500	4,500
Factor of safety	2.0	2.1	2.06
Weight per foot, lb.	0.399	0.458	0.304
Wind load per foot with ice, lb.	0.772	0.793	0.884
Resultant load per foot, lb.	1.086	1.153	1.158
Virtual coefficient of expansion, per °F.	9.2×10^{-6}	9.2×10^{-6}	10.5×10^{-6}
Virtual modulus of elasticity	18×10^{6}	18×10^{6}	12.8×10^{6}
Sags on 600ft. span:			
Maximum sag at 122° F. without loads	16.44ft.	10.08ft.	10.32ft.
Minimum sag at 22° F. without loads	13.02ft.	6.66ft.	5.4ft.
Comparative max. wind loading	0.97	1	1.12
Maximum horizontal displacement of conductor by wind at centre of 600-ft. span	9.26ft.	5.4ft.	8.1ft.
Maximum angle of deflection of conductor by wind at 122° F.	34°	33°	52°

Although the original weight of the cadmium-copper conductor is greater than that of the s.c.a. conductor, in the loaded condition with wind and ice loadings as laid down in the Electricity Commissioners' Regulations, El.C. 53 (namely, ½ in. radial thickness of ice and 8 lb. per sq. ft. wind pressure), the resultant weights, which determine the conditions of erection, are practically equal. While the maximum sags for the two conductors on equal span lengths are approximately the same under the assumed conditions of erection, the maximum

wind load and deflection of the cadmium-copper conductor are appreciably less than those of the s.c.a.

For a given conductivity the overall diameter of a cadmium-copper cable is usually less than that of other high-tensile conductors. The ice and wind loadings therefore are a minimum and, since the latter consideration is one of the most important factors governing the strength of supporting structures, the use of a cadmium-copper conductor may result in an appreciable saving in support and foundation costs.

The small diameter which is of considerable advantage in reducing the wind and ice loading is a disadvantage with voltages of over, say, 100 kV, when the prevention of corona may necessitate the use of a large diameter, but the major portion of the lines now being erected in this country operate at voltages at which the question of corona is unimportant. For the higher voltage lines hollow conductors of large diameter are being used extensively in other countries.

Owing to the greater weight of cadmium-copper conductors and the smaller wind loads to which they are subjected, their wind control is often superior to that of other types of high tensile conductor. Not only is their maximum horizontal deflection from the mid position comparatively small, but the swing of the insulator strings at the points of support is also a minimum, with the result that less difficulty is likely to be experienced in maintaining an adequate clearance to nearby metal work which may be at earth potention. A reduction in spacing with cadmium-copper conductors may therefore be possible.

The modulus of elasticity of hard drawn cadmium-copper may be assumed to be the same as that of ordinary copper, namely, about 18×10^6 lb. per sq. in., while its coefficient of linear expansion may be taken as about 9.22×10^{-6} per deg. F. The comparatively high modulus and low coefficient of expansion indicate that cadmium-copper is subject to less variation in sag with changes of load and temperature than are composite conductors incorporating a material with a comparatively high coefficient of expansion.

This consideration may be of considerable importance, particularly if a line traverses hilly or uneven country when, in order to ensure that "uplift" will not occur at any point of support, the heights of structures have often to be increased at points at which the conductor may tend to lift under cold conditions. The variation in sag of the cadmium-copper conductor mentioned in the table, is, for instance, only slightly more than three feet for a range of temperature of 100 deg. F. As temperatures fall below 22 deg. F. the comparatively small variation in sag of the cadmium-copper conductor may result in an appreciable saving in the cost of supports in cases when "uplift" has to be guarded against.

The erection of cadmium-copper conductors presents no difficulty. Like all conductors they should be handled with reasonable care, although they do not require the exercise of the special precautions necessary when handling conductors of softer materials. At intermediate points of support the usual type of pin-insulator binding or suspension-insulator fittings as used for copper conductors are suitable, although at terminal positions tension clamps may need some slight modification to allow for the higher erection tension. Cadmium-copper is harder than ordinary copper and can withstand a higher-clamping pressure, but this alone may not be sufficient to deal with the increased loading and it may be necessary to use a clamp slightly longer than is usual with ordinary copper conductors of similar diameter.

The resistance of cadmium-copper to corrosion and other deterioration is of the same high order as for copper itself and the resulting low rate of depreciation coupled with a high scrap value renders it one of the most economical conductor materials at present available.

The bronze conductors erected over the Thames at Dagenham, which constitute probably the most important river crossing on the grid system, have a core of cadmium-copper. In this case the wires are 0.0856 in. in diameter and have a tensile strength slightly exceeding 45 tons per sq. in. with a conductivity slightly more than 85 per cent. of the I.E.C. standard for annealed copper.

British Standard Specification No. 23 (1933) deals with cadmium-copper trolley wire for traction purposes and B.S.S. No. 175 (1927) with telegraph and telephone wires. A new standard specification for cadmium-copper conductors for power transmission lines is now in course of preparation.

Sydney, N.S.W., Illuminated for the Duke of Gloucester's Visit

1. Grace Building, York and King Street. 2. Archibald Memorial Fountain, Hyde Park. 3. Anzac Memorial, Hyde Park. 4. Farmer's and Gowing Bros. emporiums, George and Market Streets. 5. The Sun Newspaper Building, Elizabeth Street. 6. Town Hall. 7. The "Sydney Morning Herald" building, Hunter Street

Air Conditioning for Enclosed Machines. By H. Neale

An explanation of the filtering and closed-circuit cooling systems

INLET air conditioning, either by filtering or cooling, is generally necessary for enclosed electrical machinery in dusty situations; where the ambient air contains fumes or matter in suspension harmful to insulation; and for large high-speed machines. Filtering may be employed for both the first and last, while closed-circuit cooling is necessary for the second.

The quantity of solid impurities contained in air varies over wide limits, according to the site, and tests in industrial districts have shown a daily average during working hours varying from 0.3 to 0.8 lb. per 10^7 cu. ft. of air. Taking a figure of 0.6 lb. in the case of a turbo-alternator requiring 20,000 cu. ft. of cooling air per minute, the solid matter passing into the machine in 12 hr. would amount to 0.86 lb. Apart from that which passes out at the air discharge, the matter would be deposited in various parts of the machine, precipitation being assisted by change of direction of the entering air in dividing among the different ventilating paths.

Three effects of the deposited duts are: clogging of constricted air passages; coating of exposed winding and heat radiating surfaces; and a decrease of clearance spaces between live parts and the frame. The second effect results in prevention of the cooling air from coming into direct contact with the surfaces. A surface dissipating heat has adhering to it a thin film of hot air, through which the heat is conveyed to the moving cooling air. The film is "scrubbed" away when high velocity air impinges on the surface, so that fresh cooling air continually comes into contact with the heated surface. Thus a coating of dust on the surface prevents the cooling air from coming into direct contact and lowers the rate of heat dissipation from the machine for a given quantity of air.

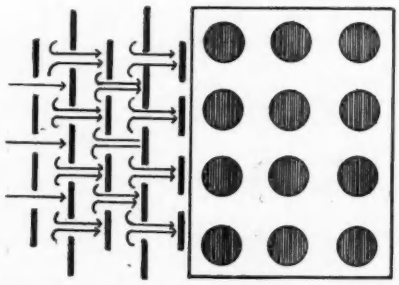


Fig. 1 (left): Air-flow in a type of dry filter which consists of a number of plates perforated as in fig. 2 (right)

Filters may be classified broadly as dry, wet or viscous. Dry filters are usually of the "cloth pocket" type, the principle being similar to that of the dust collecting bag in a domestic vacuum cleaner. The customary form employs a number of pockets open at one end and drawn over a frame, the surface of the cloth exposed to the incoming air being "raised" to trap the dust.

Another and novel form of dry filter (which has been used extensively on the Continent) consists of a number of perforated plates, all except the first of which are covered with a non-inflammable fabric (figs. 1 and 2). Passing through the holes the air impinges on the solid surface of the next plate, the dust being retained by the fibres of the fabric. Here again precipitation is assisted by the continual change of direction of the air flow. A complete filter is made up of a number of plates up to fifteen, according to the air quantity. Cleaning is effected by shaking the plates.

The principle of the wet filter or air washer is to bring the impure air into close contact with water, either sprayed into the inlet chamber or flowing over large area surfaces. In the former case the water forms a finely divided "mist," while in the latter the action is somewhat similar to that of the viscous filter, the water taking the place of the viscous medium. Fig. 3 shows roughly the layout of a spray filter of the contra-flow type, in which the water spray is directed against the incoming air. This arrangement is found to be the most effective. After passing through the spray, which washes out the dust in suspension, the air comes into contact with a series of eliminator plates arranged to remove free moisture before the air enters the machine.

In fig. 4 the principle of the surface-type filter is shown. The water is circulated by a small centrifugal pump. After passing through the sprayers or over the surface plates the water collects in a tank in the base of the filter, from which it is drawn through a strainer and recirculated by the pump. "Make-up" water, to compensate for loss by evaporation, is provided from the main by a ball valve.

In addition to being cleansed the air is also cooled by an amount dependent on the difference between the wet and dry bulb temperatures of the entering air. The wet air filter has largely given place to the dry and viscous types for use with electrical machinery.

The constructional details of the viscous filter take various forms, but the principle is the same in all cases. The entering air flows over a large surface area coated with a viscous or tacky substance to which about 98 per cent. of the suspended solids adhere when the filter is clean.

A complete filter is built up of a number of units or cells for convenience in cleaning. These are contained in a frame, which may take the form of a plain flat panel in the smaller sizes, or a completely enclosed box with circular outlet duct to economise in space. Alternative arrangements are shown in fig. 5, while fig. 6 illustrates a box filter as applied to a turbo-alternator.

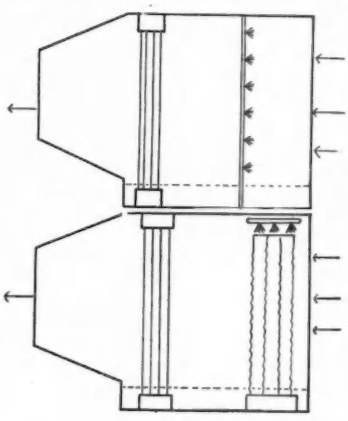


Fig. 3 (top): Spray filter of the contra-flow type. Fig. 4 (below): Principle of the surface filter

Sheets of expanded metal, or similar material which will produce a cellular effect with a minimum air resistance, are often employed in the construction of the units. Each unit is usually capable of dealing with 600-800 cu. ft. of air per minute, with a resistance of about 5 mm. water gauge when clean.

It is customary to employ spare cells to the number of 10 per cent. of the total, and to clean and re-dip the cells regularly in rotation. Cleaning is effected by washing in hot soda ash solution. After draining, the cells are dipped in the viscous fluid, drained and replaced.

Cleaning and redipping tanks are chosen according to the size of the filter, ranging from two or more separate tanks with steam coils for large filters to a single combined tank for small installations. The viscous filter is used extensively on various sizes of machines from small motors, for which a single unit mounted on the machine itself suffices, to relatively large turbo-alternators. No type of filter will remove more than about 98 per cent. of the contained dust. The remainder is composed chiefly of invisible particles smaller than 0.0002 in. in diameter.

Air Coolers

Closed circuit cooling equipments embody essentially a heat extraction unit in the form of a nest of tubes through which the cooling medium flows. The heated discharged air from the machine passes over the tubes, is cooled, and returns to the machine to be recirculated.

The circulating air does not come directly into contact with the cooling medium or with the external atmosphere; thus its character remains unchanged once the machine is put into commission and the internal air circuit is closed. "Breathing," from hot to cold conditions, takes place, as with the plain totally enclosed machine, but it has no appreciable effect on the nature of the internal air.

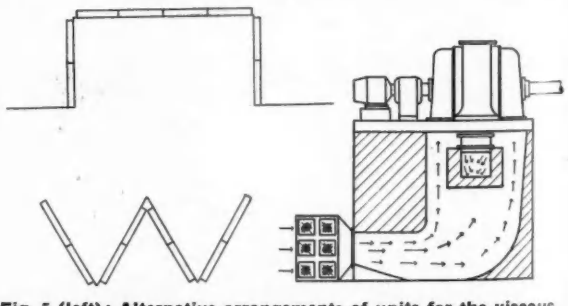


Fig. 5 (left): Alternative arrangements of units for the viscous filter. Fig. 6 (right): Application of a box viscous filter to a turbo-alternator

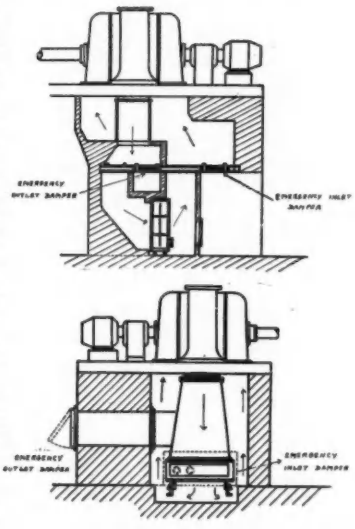
For small motors the cooling medium may be the external air, blown through the cooler by an external fan, but for large machines water must be employed.

The complete heat extraction equipment may vary according

to the size of motor or alternator, the layout for a turbo-alternator with ventilating fans integral with the rotor generally comprising: cooler; hot-air discharge duct for connecting the alternator central air outlet to the cooler or foundations; emergency air outlet and inlet dampers; runways for the cooler; damper-control column with connecting rods or pulleys and wires; hot-air and cold-air index thermometers with dial and capillary tubing for operating the alarm device; bell or other audible device; and red lamp for visual warning.

Construction of Cooler

The cooler usually consists of a nest of horizontal tubes contained between tube plates, joints being formed by ferrules and packing somewhat on the lines of condenser practice. The tubes are gilled to ensure efficient heat transfer and are commonly made in 70/30 brass for ordinary water conditions. For sea, canal, or other impure water Admiralty mixture (70/29/1) or aluminium brass may be employed, with tube plates of Muntz metal. Headers of cast iron are hinged to allow easy inspection and cleaning of the tubes and are divided to give the required number of water passes.



Figs. 7 and 8.—Typical heat extraction layouts

A drip space is usually provided between the tube ferrules and the live air passing through the cooler, to prevent any water leakage from passing into the air stream. The water supply should, of course, be taken from the suction branch of the circulating pump.

Emergency outlet and inlet air dampers are essential to allow the alternator to be opened to the external atmosphere in the event of a water-supply failure or serious tube leakage; overheating of the machine while being taken out of commission is thus avoided. The arrangement should preferably isolate the cooler from the air circuit. Both dampers may be operated from a control column on the turbine floor level by a system of levers or wire ropes and pulleys, the column also carrying the hot- and cold-air index thermometers and audible and visual alarms.

The hot-air thermometer is arranged to operate a relay at a predetermined temperature, the dampers being opened by hand on the alarm being given, assuming the rise in temperature to have been occasioned by water failure and not by an internal fault. Alternatively, the dampers may be automatically solenoid operated, but in such a case it is necessary for the relay system to be interlocked with the alternator protective gear to ensure that the dampers do not open on a rise in temperature due to an internal short-circuit or other fault, which may cause a fire in the machine. In the latter event the oxygen content in the closed air circuit is rapidly consumed.

The heat loss of a turbo-alternator is sometimes employed to raise the temperature of the condensate, thus improving the thermal efficiency of the plant. If, as is usual, the quantity of condensate is not sufficient for the cooling needs, the cooler is made in two sections, one section using condenser circulating water.

Layouts are shown in figs. 7 and 8, the latter exhibiting the "underslung" arrangement frequently employed. A variety of arrangements is possible, depending on the foundation space available. The emergency outlet damper is sometimes embodied in an outlet on the top of the alternator frame.

An important advantage of closed-circuit cooling is that the alternator is not affected by a high ambient air temperature such as obtains in tropical climates, provided cooling water at a suitable temperature is available. A continuous maximum rated turbo-type machine designed to B.S.S. 225 must have an inlet air temperature not exceeding 40 deg. C. Should an air filter be used in an ambient air temperature materially exceeding this figure it is necessary to reduce the alternator temperature rise accordingly. By employing a cooler, however, the air inlet can be maintained at 40 deg. C., enabling a standard B.S.S. 255 machine to be installed.

As an example of closed-circuit cooling, let us take the case of a turbo-alternator having a heat loss of, say, 300 kW (at c.m.r.) and requiring 25,000 cu. ft. of air per minute, the inlet temperature being maintained at 40 deg. C. Allowing a rise of 19 deg. C. per 100 cu. ft. per minute per kW loss, the outlet air temperature will be:

$$40 \text{ deg. C.} + \frac{(300 \times 19 \times 100)}{25000} = 62.8 \text{ deg. C.}$$

Assuming a circulating water inlet at 86 deg. F., the conditions are: air inlet to alternator, 104 deg. F. (A_2); air outlet from alternator, 145 deg. F. (A_0); and water inlet, 86 deg. F. (W_1).

A suitable design of cooler in this case would entail an increase in the water temperature of about 8.5 deg. F. (W_0—94.5 deg. F.).

Taking Joule's equivalent as 778, the quantity of water required would be

$$\frac{300 \times 33{,}000}{0.746 \times 778 \times 8.5 \times 10} = 200 \text{ gal. per min.}$$

A factor in the design of the cooler is the mean temperature difference, as established by the formula

$$\frac{(A_0 - W_0) - (A_1 - W_1)}{\text{Log } e \dfrac{(A_0 - W_0)}{(A_1 - W_1)}}$$

In the present case the m.t.d. would be

$$\frac{(145 - 94.5) - (104 - 86)}{\text{Log } e \dfrac{(145 - 94.5)}{(104 - 86)}} = 31.6 \text{ deg. F.}$$

Satisfactory turbulence of the water passing through the tubes is ensured by choosing a suitable diameter in relation to the water velocity, and its kinematic viscosity at the working temperature.

Telephones in Mines

IN 1933 the Secretary for Mines published Safety Pamphlet No. 8, describing methods to be adopted to prevent the risk of firedamp being ignited by sparking in signalling and telephone systems used underground in mines. Circular No. 75, just issued, deals in more detail with the precautions that must be taken with installations of magneto-telephones. Hitherto the Mines Department's certificates of intrinsic safety (as distinct from flameproofness) have been of limited application in respect of this type of apparatus. There has been an implied warning that the assurance of safety obtainable by certification was lost if two or more different types were mixed in the same circuit.

The Ministry of Mines states that further research has been carried out with the co-operation of the manufacturers concerned, and a means has been found of overcoming the restriction against intermixture of different certified types. The solution of the difficulty involves fitting a suitable condenser across the terminals of every telephone ringer and extension bell. Types of condensers, submitted by the manufacturers of intrinsically safe magneto-telephones, have now been certified as to their suitability for the purpose and, in particular, as to the method of attachment to their respective types of ringers. Mine managements who choose the method of intrinsic safety for the protection of their magneto-telephone installations should forthwith obtain from the makers of whatever type or types of certified magneto-telephone they have in use a sufficient number of condensers of certified type to fit one to every bell in the telephone system. Full instructions will be provided by the manufacturers to enable condensers to be properly fitted *in situ* by the colliery electrician. Particular care should be taken to see that the condensers, once fitted, are never removed while the telephones or bells remain in use.

The necessary isolation of underground circuits from uncertified instruments on the surface can be effected by the interposition between the surface and underground lines of a special type of switchboard, such as will permit through-speaking but not through-ringing. Alternative devices which would permit of safe through-ringing as well as through-speaking have been suggested, but have not yet been developed to the stage of complete safety or of practical working efficiency. The coupling will be made through a condenser, and not directly. This involves the attendance of a switchboard operator during such times as through-connection may be required. In flameproof enclosure (with armoured cable) no difficulty arises from intermixture of types and no further precaution is necessary.

Electric Home Costs. By Diana Thorne

WE reside in what may probably be termed an old-fashioned house as it was built about forty years ago; it contains two reception rooms, four bedrooms, a dressing-room, a kitchen, and the usual domestic offices. The family consists of my husband, myself, two children, and a maid.

It would not be correct to describe the house as all-electric, as the kitchen has a fire-heated boiler, which gives excellent service, and is used in conjunction with a water-heater, thermostatically controlled.

All wiring has been carried out in rubber-covered cable and has been successfully concealed by drawing it under the floorboards and securing it in places with cleats. The connectors for each of the self-contained units are interchangeable. All fires are fitted with 15-A plugs, and other appliances with 5-A, thus preventing a fire from inadvertently being plugged into a small-current unit.

The fixed charge for electricity is £4 7s. 6d. per annum, being 12½ per cent. of the rateable value. Two meters are provided, one for power and the other for the lighting circuit. 100-W lamps are used throughout, except in the bathroom, lavatory, pantry, hall and landing, where a lower wattage gives ample illumination.

A front-door bell-push operated from the mains and combined with a neon-lamp indicator provides a very useful service.

The house is fitted with tubular electric heating, thermostatically controlled at 50-55 deg. F. Both reception rooms measure approximately 20 ft. by 12 ft. Two 6-ft. tube lengths in each room were installed at first, but, later, additional heaters were placed in the windows, which are very large,

The lounge with an imitation log fire and tubular heating, and (right) three-tier heaters under a window

and it was, therefore, necessary to offset the cold down draught induced by the large area of glass. These are mounted in three-tier banks, the lowest one being about 6 in. from the floor; the loading is 60 W per ft. run, giving a surface temperature of approximately 180 deg. F.

In the hall 18 ft. of tubing is used; two 2-ft. lengths are arranged near the cloakroom at the bottom of the stairs, and a four-bank tier is affixed to the side of the stairs. A tubular heater on the landing has been designed to raise the temperature 10 deg., and it costs very little to run. The bedrooms have 6-ft. lengths of heaters in each and are controlled by one thermostat fixed on the landing. The lengths of tubular heating provide ⅛ watt per cu. ft. of air.

It may be interesting to note how the electrical appliances in the house were acquired. Seventeen months ago electric lighting was installed. This matter was gone into thoroughly, and all fittings purchased harmonised with the general furnishings. Luminous decorative ornaments were of considerable value in the restrained use of colour, and their use can no longer be called a luxury.

An electric iron and vacuum cleaner were next purchased, but the installing of an electric cooker was the really big venture, and it was with much trepidation that this move was made. We had always been given to understand that cooking by electricity was for the affluent, and totally beyond the means of the average household. A definite check was, therefore, kept on the energy consumed during certain cooking operations, and it was found that it worked out slightly cheaper than gas at 8.6d. per therm. This statement is often challenged, but when electricity is ½d. per unit its claims can be realised. Then there is greater cleanliness, absence of fumes, &c., to be allowed for.

I think that it may be regarded as strictly correct to state that electric cooking takes, on an average, one to one and a quarter units per day per person. The following table gives fairly accurate results taken over a period :—

Persons.	Units.	Rate per unit.	Total for 7 days.
3	1¼ each	1d.	2–2½
5	1 ,,	1d.	2–11
8	1 ,,	1d.	4–8

The fixed charge being almost 22s. per quarter and the rate ½d. per unit, the total inclusive charge has been assumed to be roughly 1d. per unit, although now that additional appliances have been installed this is on the high side.

The oven cooking space, 14 in. by 16 in. by 14 in., is ample for our needs, and is quite capable of giving all the satisfaction that is claimed for it. The cooker is provided with two boiling plates and one grill hot-plate. The former, if used in conjunction with correctly designed pans, are fairly satisfactory, but I am of the opinion that finer control is still necessary, not only for cooking purposes, but for economy reasons. When boiling or stewing, too much heat evaporates the water rapidly and upsets the process by unnecessary replenishment. The cooker is hired from the local supply authority, and includes an electric kettle. Auxiliary cooking is done by a table cooker.

The vacuum cleaner is of the "push-running" type, as the ease with which this may be used has been found to be less fatiguing than by employing any other method. As several of the floors are of parquet wood an electric polisher has been acquired more recently.

Installed in a cupboard in the bathroom is the 30-gal. water-heater. Heat insulation is provided by a number of layers of corrugated paper, which are covered with canvas and then bound and stitched in position. This form of lagging has much to commend it, for, first, it is cheap, and, secondly, it allows enough hot air to escape to make the large cupboard into an ideal airing place. An electric towel rail has recently been added to the bathroom equipment.

Appliances with a small consumption but of great utility include an electric iron, vacuum cleaner, coffee percolator, clocks, sewing-machine motor, washing machine, and radio-gram. These have been used regularly by a country maid to whom the applications of electricity were unknown previously.

Power plugs have been allocated as follows: Dining room, two 15-A and two 5-A; lounge, two 15-A and two 5-A; kitchen, three 15-A and two 5-A; bedroom No. 1, one 15-A and two 5-A; bedroom No. 2, one 15-A and one 5-A; bedrooms Nos. 3 and 4, one 15-A and one 2/3-A in each; hall, one 15-A and one 2/3-A; landing, one 2/3-A.

The consumption of energy for a twelve-month period was £42 5s. To this must be added the cost of three tons of good house coal at £2 per ton, making the total charges for all heating, cooking, lighting, &c., £48 5s. The allocation of electricity is roughly estimated to be: Room heating, 60 per cent.; water heating (used in conjunction with a coal fire during the winter), 20 per cent.; cooking, 14 per cent.; and lighting and smaller consumption appliances, 6 per cent.

Rearing Tropical Fish

Suitable electrical equipment for aquaria

IT may be said with truth that the comparatively new industry of supplying small tropical fish is an electrical development, for the popularity of the home-water aquarium is undoubtedly due largely to the ease with which the temperature of the water can be maintained automatically by an immersion heater and thermostat. For this reason the growing demand for such aquaria should mean a little more to the electrical industry than another outlet for energy and equipment.

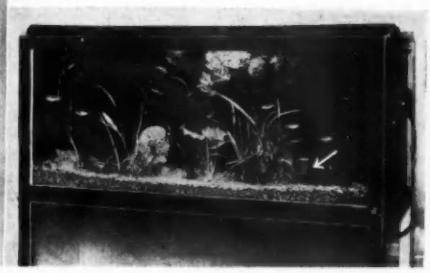
Apart from aiding hostesses in their social entertaining a properly equipped aquarium should be of considerable propaganda value in electricity showrooms. This idea was conceived during a recent visit to the Wigmore Tropical Fisheries, 74, Wigmore Street, London, W.1. Here we inspected a remarkable collection of fish, many brilliantly coloured and of strange shapes, and watched with interest their different habits.

Hitherto, the rearing of tropical fish in this country has been a difficult task, for a slight drop in the temperature of the water is likely to be fatal, and in the case of valuable fish this is disastrous. With an electrical immersion heater and thermostat, however, it is claimed that now warm-water fish may be kept more easily than cold-water creatures.

Special immersion heaters and thermostats for aquaria are manufactured by the Dowler Electrical Engineering Co. The designs and loadings of the equipment have had to be carefully calculated as the operating conditions are severe, the heaters being in service most of the day and night practically all through the year, usually operating with many "makes" and "breaks" per day. It is obviously impossible to heat insulate an aquarium.

Tropical fish require a water temperature of from 75 to 85 deg. F., varying, among other things, according to whether or not breeding is desired. The popular sizes of tanks are up to four cu. ft. capacity, and for these a loading of 150 W, with thermostatic control, is usually satisfactory. A little excess of heat is demanded by automatic control for quick operation.

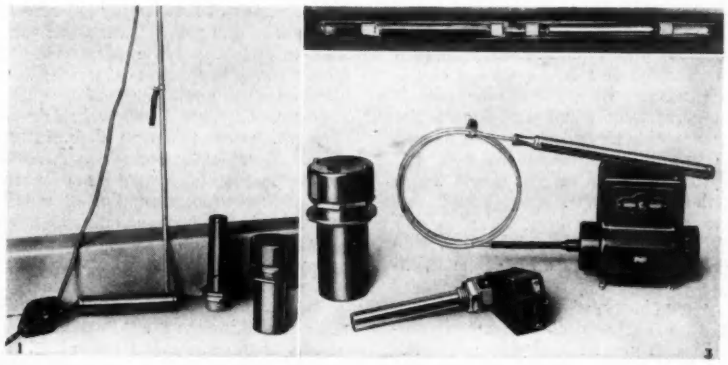
The standard 150-W heater for permanent fixing has two 75-W spirals of No. 42 nichrome wound on a porcelain former, but the unit can also be supplied with one 75-W coil. The resistor wire operates at black heat.



A 4 cu. ft. aquarium with overhang heater (left) and a 2 cu. ft. tank in which a rock is removed to show the fixed heater (indicated by arrow), the thermostat being concealed

The porcelain former and spirals are inserted in a n.p. spun copper case lined with mica. Coil leads are brought out to mica bushed and insulated terminals on a brass plate secured to the open end of the case by screw-in pillars which receive a suitable dust cap. A spring between the terminal plate and the former keeps the latter, and consequently the heat, towards the closed end of the case and away from the terminals.

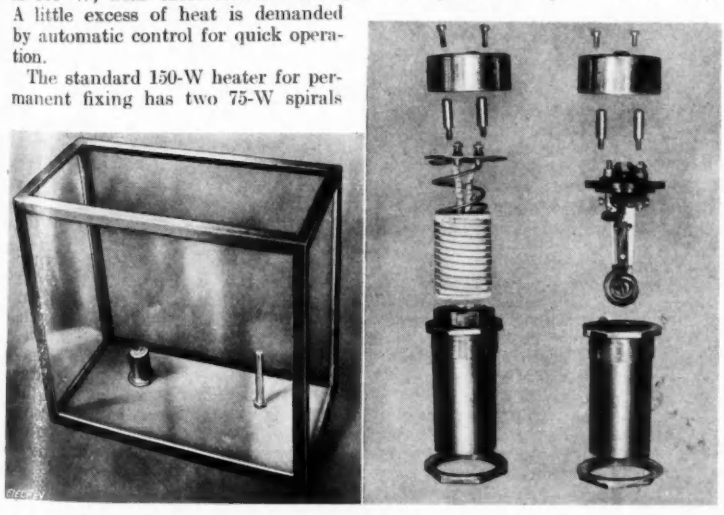
Normally, the heater is compound set into a hole drilled in the slate bottom of the tank, a screwed gland with an internal nut giving absolute security. There is a special model available for mounting through glass. A few tanks larger than four cu. ft. are supplied, and for these there are special heaters.



1. Portable and permanent tank-fixed heaters, the model in the centre being for glass fixing. 2. A two-lamp aquarium lighting unit. 3. Bi-metal, projecting scale (centre) and fluid-expansion thermostats

For use with the fixed heater just described there is a thermostat which employs the same design of case and is installed in a similar fashion. It is exceptionally sensitive, having a two deg. differential; a bi-metal coil and a magnetic make and break are other features of its design. Platinum contacts are provided and the whole of the electrical circuit is insulated from the bi-metal. A recently introduced thermostat, of exactly the same design internally, but of smaller overall dimensions, affords easier adjustment by virtue of a scale and pointer on the front of a projecting end-piece.

Another type of heater is the portable or overhang model for which thermostatic control is not available, although we understand that an overhang thermostat is now being developed. Although still popular the overhang heater is not bought so much since the introduction of the thermostat. In the main the construction of the portable unit is similar to that of the fixed equipment, but the unit proper is secured normally to the end of the suspension rod on which the position of the overhang bracket is adjustable, so affording some control of the heating by varying the depth of the heater. There are three sizes, namely, 30 W for tanks of less than one cu. ft. capacity; 75 W for tanks up to two cu. ft.; and 100 W for similar tanks with thermostatic control. A three-heat overhang unit controlled by a heating-pad type switch is also available.



An empty tank fitted with a standard immerser and a new type of thermostat (left) and the construction of a fixed heater and thermostat

Large Installations

For use with a number of tanks housed together the company markets a thermostat which operates on the fluid-expansion principle. The fluid container is inserted in one of the tanks and is connected by a metallic flexible tube to a stationary switch nearby. The setting is adjustable from 60 to 100 deg. F., and

the temperature differential can be varied from 2 to 5 deg. Fahrenheit.

The lighting of an aquarium is important, and a special n.p. reflector is made with a lip which is inserted under the angle-iron of the frame at the top front of the tank. It is designed to accommodate one, two or three standard 60-W tubular lamps, according to the length of the tank. For aerating the water there is an ingenious and simple a.c. air pump. A flexible diaphragm operates with the current alternations, and the "bellows effect" is utilised for air pumping.

Modern Insulation Manufacture

Processes at a Walthamstow factory

MICA is probably the most important material used in the insulation of electrical machinery in view of its ability to withstand mechanical pressure and high temperature and its high electric strength. Two only of the many varieties found throughout the world are ordinarily turned to electrical account, *i.e.*, muscovite (ruby, green and brown) and phlogopite (amber): Micanite, which consists of mica splittings bonded together with insulating cement under heat and pressure, can be supplied in much larger sheets than mica and in a flexible form or in a condition suitable for hot moulding.

Micanite was introduced into this country from the United States in 1893 by Messrs. A. & E. Berkeley, who founded the firm known since 1906 as the Micanite & Insulators Co., Ltd. The present works were built in 1908 and have been extended from time to time, and now with the recent completed additions they are claimed to be the largest of their kind in Europe, having a pay roll of over 600. The main sections of the factory for "Mic" products are given below in the order in which we visited them recently. The mica department deals with block mica and mica splittings, and here we also saw such varied components in large quantities as washers, insulation for commutators and condensers and strips for flat irons, kettles, toasters, cookers and radio valves.

Micanite Production

In the micanite department the synthetic processes are notably diversified—more so than would be necessary if purchasers could be induced to accept a greater measure of standardisation in their requirements. Commutator micanite is naturally conspicuous, but of at least equal interest are the methods of producing (hot) moulding micanite for shaped pieces, flexible micanite (bent cold) for armature slots and field coils, and micanite cloth and silk in rolls or sheets which has greater strength than the flexible type.

For h.v. stator coils and other conductors "micafolium" has been developed; it is a form of hot moulding micanite with a shellac-treated paper base and has an average thickness of 0.007 in.

Evidence of the growing popularity of the fractional h.p. motor is provided by the remarkable number of small commutator end rings produced with great rapidity in automatic presses.

In the "Paxolin" board shop are produced all classes of bakelite-bonded paper and fabric boards, including the new material "Paxilax." The largest of the steam-heated hydraulic presses of 4,000 tons capacity was dealing with 40 by 80-in. sheets. The "Paxolin" tube and bushing department handles varnish-paper tubes from miniature sizes up to 150-kW outdoor bushings, some of which are in use on the grid. The paper is treated on horizontal machines, one of which can take paper 10 ft. wide, while one of the tube-rolling machines, said to be the largest in the world, is capable of winding a bushing 22 ft. 6 in. long. The shop, which measures 210 by 120 ft., is entirely free from stanchions, the roof being carried on Warren girders. It also contains the machine shop and the ovens, the temperatures of which are automatically controlled. Another notable machine is that used for tube rolling for transformer cylinders up to 78 in. diameter by 110 in. long.

The feature of the "Empire"-cloth, silk and paper shop is the tower varnishing equipment which was reconstructed in 1932 and now consists of nine independent units. Here also is produced the black-varnished cloth of high tensile strength used for cable manufacture. The last of the production shops visited was that devoted to the manufacture of asbestos-cement bonded boards for such purposes as arc-shields and switch panels and known as "Paxbestos."

The Laboratories

There are two h.v. testing laboratories. One of these is used for most of the routine work and contains two 125-kW transformers and auxiliary apparatus for testing board, sheets and tapes; the other includes a 500-kV transformer and has an artificial rain plant for testing bushings. Both laboratories are equipped with Schering bridges and routine power-factor observations are taken on all bushings and high-grade boards. Other apparatus includes two high-frequency equipments for testing boards and insulating sleeving and an X-ray apparatus designed for the examination of insulating sheets and boards.

The company takes about 35,000 kWh per week from the Walthamstow undertaking. An a.c. supply at 6.6 kV is stepped down to 230 V in a private sub-station and d.c. at 230 V is taken direct from the public mains.

The larger uses for a.c. include the heating of the tube-rolling machines in the "Paxolin" bushing department, many of the ovens, compound boiler and hot plates, for which the average demand is over 200 kW. The electric clocks throughout the works are controlled by a master clock and operated from a rectified a.c. system.

A Novel Shop-window Lighting Effect

A GERMAN correspondent has sent us particulars of a novel night-time window display which is now to be seen in a large Berlin store. It takes the form of a completely darkened window in which there is a coloured bird, 7 ft. high, the feathers of which are illuminated in red, blue, yellow, and white. A cursory glance gives the impression that the bird is made of glass and lighted from its inside, but actually it is made of thick non-transparent *papier-mâché*. It is impossible for the onlookers to see how it is illuminated as an entirely new process of lighting is used.

The fluorescent bird in a Berlin shop window illuminated by ultra-violet light

As Doctor Riehl, of the Auer (Osram) Company, Berlin, explained recently, the bird is treated with different phosphoric lacquers, known as Auer colours, which this company has prepared. The bird is then exposed to ultra-violet light, the lacquered surfaces transforming the invisible rays into a visible light, of various colours, according to the composition of the lacquers on the surface.

Professor Lenard, at Heidelberg, found that the electronic impulses of light are able to penetrate into phosphorus so as to be accumulated therein and afterwards radiated as light again, but of another wavelength, *i.e.*, the phosphorus acts as an accumulator and transformer of light. For instance, green light penetrating into phosphorus will be radiated afterwards as red light, and, in a similar way, the invisible ultra-violet rays in the display window are changed into light which is perceptible to the human eye. The Auer Company has succeeded in improving the colouring effects by a combination of a special ray and special lacquer, and the improvement is claimed to be a considerable one.

The efficiency of the light transformation has been shown to be from 30 to 40 per cent. when violet light is transformed and radiated as green or yellow light. Remembering that the output of an ultra-violet light source, such as the zinc-arc, is very much higher than that of an ordinary incandescent lamp, it may be concluded that a combination of ultra-violet light sources with phosphoric materials may prove more economical in use than ordinary lamps for this type of lighting.

A Large Forging Press

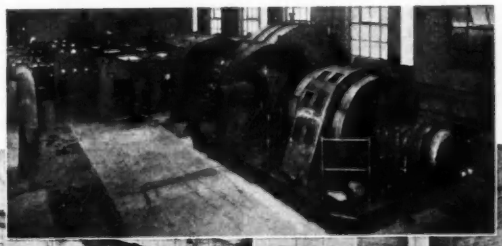
Sheffield installation which utilises electro-hydraulic machinery

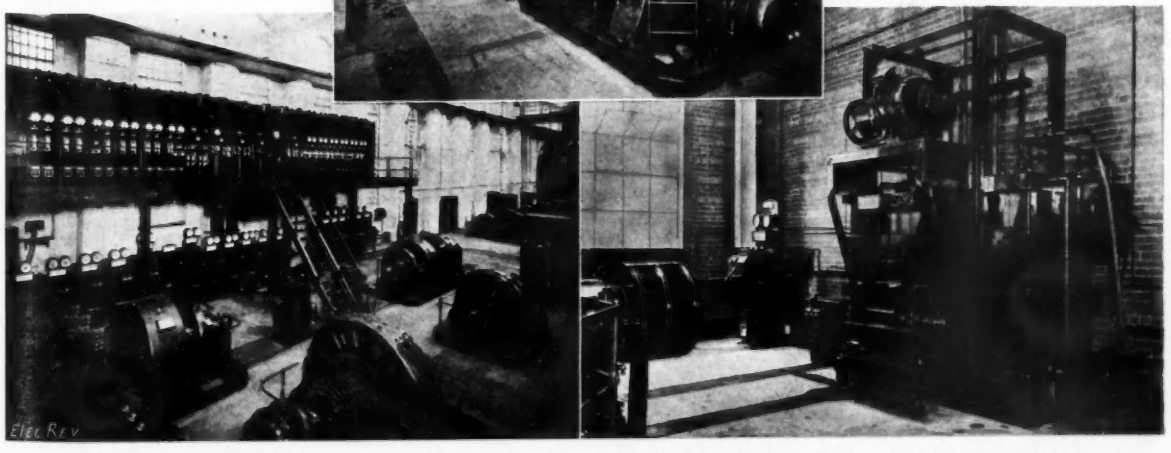
THE English Steel Corporation, Ltd., is known to our readers chiefly as the manufacturer of boiler drums and steam receivers and heavy electrical rotors for power stations. It was formed to take over the steel interests of Vickers, Armstrongs & Cammell, and in 1932 completely re-equipped its works at Sheffield. The new heavy forge, which is capable of dealing with ingots up to 250 tons, is now complete, and the 7,000-ton press is, we believe, the largest in the world to be operated by a high-pressure electro-hydraulic pumping set. A working pressure of 2¼ tons per sq. in. is given by the single main forging cylinder and ram, while the penetration speed is 2 in. per sec. The pump driving the press has three stainless-steel rams 7¾ in. dia. by 3 ft. stroke, which give a maximum pressing speed of 2 in. per sec. Their average speed is 500 ft. per min., which falls to 400 ft. at full load by the operation of an automatic slip regulator of the Ward-Leonard rolling-mill type. The pump capacity is 1,295 g.p.m. at 526 r.p.m. and 1,432 g.p.m. at 576 r.p.m.

The press in operation

The pump is driven by a 2,500-h.p. 6.6-kV s.r. motor with a pull-out torque equivalent to 7,000 h.p. at 600 r.p.m. The efficiency is 95.4 per cent. at full load and 93.95 per cent. at half load, the corresponding power factors being 0.905 and 0.815. Full-load rotor current is 1,086 A at 992 V. The peak load demand may reach 6,500 h.p., but the peak energy is provided by two high-speed flywheels on the gearing set, which are brought into operation by the slip regulator. The gearing set has a reduction of seven to one. The complete equipment weighs about 400 tons. It was designed by Messrs. Vickers-Armstrong, Ltd., the electric motors and switchgear being supplied by the Metropolitan-Vickers Electrical Co., Ltd. The press plant operates on the closed air-vessel system operating at 70 to 55 lb. per sq. in.

For conveying the reheated ingots from the furnace to the press and manipulating them during forging, two cranes are installed, one of 200 tons and the other of 120 tons capacity. The main hoist motion of the larger is fitted with two-speed gear to give 9 ft. per min. with full load or 18 ft. with 100 tons.





Part of the works sub-station, which also contains hydraulic and compressed-air plant (left); auto slip regulator and main oil-circuit-breaker in the forge pump house (right); and the motor-driven pump (above)

Motor Control System

The system of controlling these motors is the first of its kind to be applied to a crane in this country. A "Metadyne" generator, which gives constant current over a wide voltage range by varying the excitation, is interposed between the supply and the motors, giving characteristics similar to those of a steam engine. The motors may be stalled and still maintain torque, or operated over large differences in speed in either direction, and the usual contactor starting and regulating panels with resistances are eliminated.

The crane driver can obtain enough opposing torque at the motor pinion to balance that due to the weight of the load on the crane hook, thus supporting the load independently of the brake. This enables the crane to follow automatically the movements of the press during forging without control by the driver.

For tool changing and general work an auxiliary hoist of 40 tons at 20 ft. per min. and driven by an 80-h.p. motor is used. The crane has a longitudinal trailing speed of 120 ft. per min. and a cross-traversing speed of 50 ft. per min. The turning gear is fitted with a 30-h.p. motor driving a bridle chain at 16 ft. per min.

The second crane has also main and auxiliary hoist motions of 120 tons and 40 tons, both at 20 ft. per min. The 325 and 100-h.p. 220-V d.c. motors are operated through contactor gear by master controllers. The longitudinal and traversing speeds are 120 and 70 ft. per min.

Switchgear for the crane installation was supplied by Messrs. A. Reyrolle & Co., Ltd., and the Metropolitan-Vickers Electrical Co., Ltd.; the latter company also provided the Metadyne and the motors.

The 6.6-kV and 440-V a.c. and 220-V d.c. supplies are taken from a sub-station fed from the works power station by two 6.6-kV 0.25 sq. in. three-core p.l.c., s.w.a. cables and containing transformers, convertors, and switchboards.

The Building and its Lighting

Sir Wm. Arrol & Co., Ltd., were responsible for the building which houses the press. It is 76 ft. wide, 415 ft. long, and 60 ft. high to the eaves, and has a crane span of 70 ft., the crane gantry rail being 44 ft. above floor level. To accommodate the reheating furnaces there is an annexe to the main building.

Careful attention has been paid to the lighting of the department by means of correctly spaced reflector-type fittings using gas-filled lamps suspended from the roof trusses, supplemented by the use of angle-type fittings fixed at a lower level round the press itself.

The Corrosion of Non-ferrous Wires

One of the several papers presented at the twenty-seventh annual general meeting of the Institute of Metals in London on March 6th and 7th explains the effects of five years' atmospheric exposure on non-ferrous wires. The author, Dr. J. C. Hudson (investigator, Corrosion Committee, Iron and Steel Institute and British Iron and Steel Federation) has gauged the extent of corrosion by measuring both the amount by which the breaking load of the wires was decreased by exposure and also the increase of the electrical resistance of the wires.

MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

The Engineer Administrator and His Training

THE present position of the electrical engineer in relation to those problems of administration that are becoming of increasing importance in the management of all industrial undertakings and public service organisations is reviewed in the paper by Mr. E. S. Byng which was read before the INSTITUTION OF ELECTRICAL ENGINEERS in London on March 14th. The necessity for suitable training at an early stage is emphasised, and the educational facilities now available are examined, with the object of encouraging the young engineer of to-day to equip himself systematically for the duties and responsibilities of an engineer administrator.

The justification for the title of this paper lies in the view that the alternative term of "manager" possesses a too narrow departmental significance and suggests, perhaps, a somewhat autocratic authority rather than a personal responsibility for the effective utilisation of the services of others. Furthermore, the term prepares the way for the consideration of "administration" as a generic word covering not only the more limited function of determination of policy, but also management in its varying degrees down to supervision. It would be arbitrary to attempt any definite line of demarcation.

[*Lafayette, Ltd.*

Mr. E. S. Byng is managing director of Standard Telephones & Cables, Ltd.

Administration may be regarded as a "science" incorporating a large body of ascertained, analysed, and classified facts; and also as an "art" applying such knowledge to the material and human requirements of an undertaking. It is the function of co-ordinating the "specialist" activities necessary to efficient operation.

Executive responsibility is vested in the engineer only because of administrative capacity, which it is assumed that he possesses, and apart from his scientific attainments. So interrelated are these two attributes that the tendency has been to regard administrative capacity as implicit in engineering capacity. The necessity for a knowledge of engineering technique is generally accepted, but perhaps few engineers have given serious thought to the existence of a "technique of administration," which is as necessary to the training of an administrator as technology is necessary to the training of an engineer. Without organised training, development in either capacity becomes wholly dependent on personal genius—a gift very sparsely distributed and, even where it does exist, likely to be inadequate of itself to satisfy the complex needs of industry to-day.

Young engineers should not be judged incapable of carrying administrative responsibility until they have been trained to this end. The qualities of an administrator are inherent and deeply set, and require time and encouragement to emerge and develop. The significance of the time factor is indeed generally underrated. The administrative faculty cannot be cultivated too early, though obviously not at the sacrifice of appropriate technological education.

Developments in this field are taking place very swiftly. Within the next two years adequate facilities for part-time teaching of the subject under consideration should be available at practically every educational centre in this country. The interests of the electrical engineering profession might perhaps best be served if all I.E.E. students and graduates were expected, before applying for transfer to a higher grade, to produce evidence that they had pursued a course of study in the fundamentals of industrial administration.

The problem for most serious consideration seems to be: What is the best course to follow in the development of the engineer as an administrator? The analogy of training for the medical profession may help to place the question in proper perspective. In the earlier days the generally accepted method of qualifying was to work under the direction of a practitioner for some years, acquiring knowledge by observation and by learning from mistakes made. By slow degrees lectures, supplemented by hospital observation and practice, were admitted as superior and quicker methods of qualifying. The medical profession is about to set a further example of great significance to all other professions by inaugurating "refresher" courses for practitioners, very much on the lines employed for a long time by the military authorities.

Good Examples

The Department of Business Administration at the London School of Economics offers the nearest business equivalent to hospital training at the moment. One of the most stimulating examples of organised executive training is the training school of the Post Office Engineering Department where probationary assistant engineers are brought into intimate touch with practice.

The trained mind of the university graduate is thus given direction in industrial matters before being employed upon executive routine. This systematic introduction to realities has a favourable influence on the ultimate usefulness and adaptability of these young men. There is no risk of their natural enthusiasm being suppressed at a very critical stage, as so frequently happens in industry. Similar methods may help to solve the problem of preparing for his future career in industry the young graduate fresh from the university.

For over twenty years Standard Telephones and Cables, Ltd., has provided a course in electrical communication in which students are made acquainted with the company's organisation and business methods in general. The complexity of modern business in large-scale organisations makes some such arrangement necessary in order that men capable of coping with the problems of the future may be forthcoming.

Appendices to the paper include a selection of books which will be helpful in the study of industrial administration and a list of educational institutions in Great Britain conducting courses in the subject.

Unusual High-pressure Steam Generators

A SYMPOSIUM on high-pressure boilers was considered at a meeting of the INSTITUTE OF MARINE ENGINEERS in London on March 12th, at which seven short papers, each dealing with a different type of boiler, were submitted.

The Benson type, said Dr.-Ing. E. L. E. Goos, was the only super-pressure design so far installed in a merchant vessel. In view of four and a half years' continuous service the Hamburg-Amerika Line had decided to have the new turbo-electrically driven ship now being constructed by Blohm & Voss, Hamburg, for the Far Eastern service fitted with four Benson boilers.

The rectangular combustion chamber was entirely surrounded by tubes through which water passed in continuous flow. There were no drums. One of the oil-fired boilers for the above-mentioned new ship weighed three tons only and the space occupied would be 100 cu. ft. per ton per hour of steam at 1,500 lb. pressure and a temperature of 900 deg. F. Where weight and space were of vital importance it was claimed that those values could be reduced to 0.7 ton and 35 cu. ft. respectively.

The latest development of the "Atmos" boiler was described by Mr. J. Viktor Blomquist as consisting in the burning of the fuel, whether gaseous, liquid, pulverised, or solid nuts, within a cage rotor revolving at 12 r.p.m. This design was said to be very insensitive to the quality of the feed water. The steam generating tubes had internal loose soft iron bars which constantly scraped off scale incrustation resulting from impurities in the feed water.

The outstanding characteristic of the La Mont boiler was described by Dipl.-Ing. D. W. Rudorff as the use of forced water circulation through the tubes. The pressure drop that must be overcome by the circulating pump did not exceed 35 lb. per sq. in., so that for an average boiler the power needed to drive the pump amounted to only about one-half per cent. of the energy output of the boiler. Besides preventing overheating of the tubes the high velocity of circulation minimised the accumulation of scale. The small diameter and great length of the tubes had beneficial effects on the heat transfer, cost of construction and the weight of the boiler. These features, combined with the unimportance of the tube inclination, allowed wide latitude in design without resort to radical departures from standard practice.

The Loeffler boiler was claimed by Mr. S. McEwen to ensure a better utilisation of the heat in the steam, making it practically possible to generate and utilise steam at a pressure of 1,900 lb. per sq. in. and a temperature of about 900 deg. F.

A radiant superheater enclosed the combustion chamber, above which were a convection superheater, an economiser, and an air heater. The evaporator drum was placed in any convenient position outside the boiler setting. A steam circulating pump extracted steam from the evaporator drum and forced it through both superheaters, beyond which part of the steam passed to the supply range while the remainder was returned to the evaporator drum.

Superheated steam was forced to pass through the water in the drum, there giving up its superheat to the water and so producing additional saturated steam. Feed water was forced into the steam line wherein some evaporation took place, and a mixture of saturated steam and water entered the drum above the water level. All the steam was thus generated in vessels not exposed to any external heat, while the tubes which were heated externally contained only dry, clean, and dense steam.

The conditions necessary for the satisfactory operation of the Sulzer single-tube boiler were described by Mr. J. Calderwood as (*a*) tube length of the order of 30,000 times the internal diameter of the tube, or roughly half a mile per inch tube diameter; (*b*) a high velocity through the tube, giving considerably greater feed-pump pressure than steam pressure; (*c*) thermostatic regulation (from the steam temperature) of the rate of water feed; (*d*) secondary feed (about 10 per cent.) injected at the point in the long tube where the steam became dry saturated (*i.e.*, near the beginning of the superheater) in order to avoid time lag between the entry of the water and its influence on steam temperature.

The "Monotube" (with welded joints) was arranged in bundles to suit the space available, either upright when there was head room, or horizontally, and dimensions could be very much reduced by using a very high rate of forced draught. This boiler was extremely safe, since the amount of stored energy was very small and the total weight of water in the boiler was only that contained in the tubes.

The "Velox" steam generator, according to Mr. M. G. S. Swallow, was not confined to any particular pressure range. It was of tubular construction and small dimensions, there being no drum in contact with the flame and, as generally understood, no steam or water drums were used. The aim of the Wagner-Bauer design had been so to arrange the water tubes and drums as to induce intensive natural circulation. On account of the high stresses, said Mr. O. Jebens, special steels had to be used for the construction of the drums and water tubes.

High-voltage Alternators

THE designs of normal and concentric-conductor types of alternators for generation direct at high voltages are described in the paper by Mr. P. E. Crawshaw Smith that was read before the London Students' Section of the Institution of Electrical Engineers on March 8th.

The advantages of a higher generated e.m.f. include the savings effected by the elimination of step-up transformers and their losses, which, when capitalised, represent a considerable part of the total capital outlay. The smaller current requiring to be conducted away from the machine reduces the cost of cables and simplifies their arrangement. A comparison of the installation costs of alternators to generate at 11 and 36 kV shows the cable costs to be £39 per yard run in the case of the lower-voltage machine, as compared with £21 in the other.

There is also a smaller full-load loss as the result of eddy currents due to the reduction of the current in the windings. This also lowers the stresses on the windings when the machine is subjected to short circuits.

Other advantages that apply only to the Parsons concentric-conductor machine are a more efficient utilisation of the insulation by the intersheathing effect of the concentric conductor, which has some resemblance to an intersheath-graded cable, one difference being that the intersheath does not carry any useful load. Also this design is more resistant to voltage surges, since the inherently high capacitance between winding turns forms a chain to earth which presents a relatively lower impedance to surges.

To keep the short-circuit current to the same proportion of the full-load current it is necessary to give the h.v. machine an inherent reactance equal to that of the l.v. machine and its attendant transformer. This is simplified by the arrangement of the slots, which also keeps the stator flux density uniform and ensures a uniform distribution of the winding.

The success of alternators generating at 33 kV makes it possible to step up to 66 kV with auto-transformers. While this would be less economical than direct generation at the higher voltage, it would be cheaper than the use of a l.v. machine combined with a normal transformer.

It is usual to operate these 33-kV alternators with an insulated neutral, although they can work with an earthed neutral point. Under working conditions the insulation to earth of the outer at the neutral point is only subjected to one-third of the phase voltage. If an earth fault occurs on one phase, the voltage of the neutral point will possibly rise to the phase voltage, in which case the outer of a 36-kV machine will be subjected to a maximum voltage of 26 kV. This figure is, however, well below the breakdown stress of 80 kV. The normal type of high-voltage machine will not suffer from this disadvantage to the same extent, but it does not possess the advantages mentioned above in connection with the concentric-conductor machine alone.

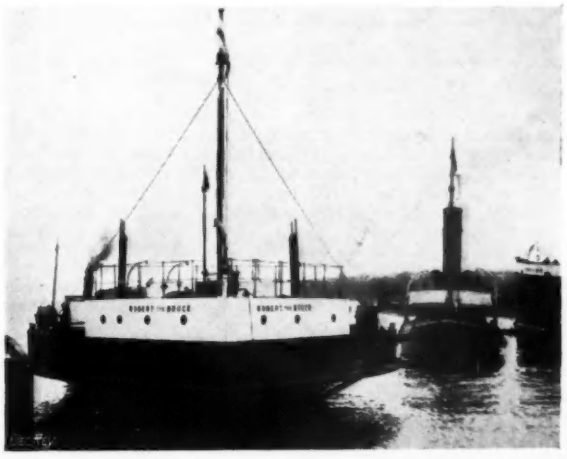
Diesel-electric Paddle Ferry Boats

ABOUT a year ago two ferry boats commenced service on the Queensland ferry passage across the Forth. These vessels were the first examples in this country of Diesel-electric paddle propulsion, and one of them is the first all-electrically welded ship to be built in Scotland.

According to a paper by Mr. M. E. Denny read before the Institution of Engineers and Shipbuilders in Scotland on March 12th, recently the hand-steering wheels on the bridge have been supplemented by an electrically driven gear to reduce the manual effort required of the helmsman and to increase the speed of action. The rudders have locking gear on their quadrants, electrically operated from the bridge, and the rudder chains are also locked on the bridge, to ensure that the rudder temporarily at the bow shall be firmly secured at amidships, since the vessels are equal ended, performing a shuttle service, with a rudder at each end.

The berthing capstans, gangways, and vehicle turntable are electrically operated. The gangway sections are composed of a number of separate channel bars keyed, but not rigidly, to a strong shaft running horizontally fore and aft at about deck level. The shaft is rotated by an electric motor through gearing, and an over-running clutch is incorporated in the train. When the fingers are raised they automatically come into one plane, and when fully lifted they form part of the bulwarks. An automatic cut-out prevents their being lifted so far that they tend to fall inboard. Hand gear can be used in the event of the electric current failing or the motors being disabled. Two searchlights are fitted on the bridge, partly to light the deck during embarkation and disembarkation.

The benefits to be obtained from completing as much work as possible in the welding bay were so great that a certain amount of inconvenience in handling large sections was accepted in view of the other advantages gained. The finished steel weight of the welded ship was 12 per cent. less than that of her sister. The necessity of following a regular and systematic procedure in carrying out the work should be emphasised. It is absolutely essential to lay down definite standards for the type of weld to be used (that is, overlap or butt), the size of the V if the plates are above a certain thickness, the size of electrode, rate of deposit (length per electrode), current values, &c., in order to obtain uniformly good results, which otherwise would become largely a matter of chance.



The "Robert the Bruce" one of the two Diesel-electric paddle boats referred to by Mr. Denny. This boat, which is of all-welded construction, was launched just over a year ago

The limited draught discouraged propellers, and the fact that the side-paddle boat—especially when, as in this case, the paddles are independently driven—is easier to manœuvre along-

side jetties than is a vessel having two screws at each end, was the deciding factor. It was not possible to avoid engine and boiler casings extending above the main deck, and this would have seriously interfered with the space available for vehicles, and greatly hampered rapid manœuvring. Consideration of all these problems led to the choice of Diesel-electric machinery. While this type of machinery entails greater first cost than does steam propelling plant, it is somewhat lighter, and carries with it a reduction in the annual fuel bill.

On the Queensferry service, the running time is about 30 per cent. of the total time on service. The main oil engines are shut down entirely while the vessel is lying alongside the jetty, the limited amount of electrical energy then required for various purposes being supplied by a small auxiliary. If the main engines were allowed to "idle" at the piers instead of being shut down, the annual fuel and lubricating oil bill would be increased by about 50 per cent.

Power is generated by two sets of Diesel engines, each set comprising one vertical eight-cylinder, four-stroke, single-acting, airless-injection heavy oil engine running at 750 r.p.m. and rated at 175 b.h.p. Each engine is directly coupled to a main generator. There are two propelling motors, each of 135 h.p., 440 V, running at 250 r.p.m. and driving through semi-flexible couplings. Each motor takes its current direct from one main generator, and in the event of one motor or generator being out of commission, both wheels can be quickly coupled together by means of a cross-connecting shaft and coupling, and driven by one motor. A safety cut-out switch to prevent overloading of the propelling motor under these conditions is provided.

Counters and gear to indicate when the paddles are running at the same speed are fitted. To prepare the electrical circuits for this condition necessitates the operation of the paddle coupling switch, which first releases a mechanical interlock enabling the two shafts to be coupled, and then so arranges the electrical circuits that only one propulsion group is in operation when the shafts are coupled. In addition, provision is made to keep the load on the propelling motor within its rating. A final protection is given by overload contactors which are controlled by the main load currents, and operate to open the excitation circuit in the event of excessive overload.

For the electrical propulsive equipment d.c. is used throughout. The main generators are rated at 110 kW, 440 V, and 750 r.p.m., and are arranged with a drooping voltage characteristic with increasing load, thus making it impossible to place an excessive overload on either the motors or the mechanical portion of the equipment. An exciter generator rated at 9.5 kW and 220 V is directly coupled to each main generator. One exciter is selected for supplying the excitation currents for all the propelling motors and generators, while the remaining one is employed for supplying the auxiliary load, such as light, heat, capstans, gangways and turntable. The method of control is on the Ward-Leonard principle, whereby the motor speed is regulated by varying the generator voltage, the engines running at a constant speed.

In addition to the main propulsion plant a 12.5-kW, 220-V auxiliary Diesel-driven generator has been provided for supplying the auxiliary load when the vessel is lying at a pier. A contactor panel operated by a push button is provided for starting up this auxiliary set.

The Causes of Factory Accidents

THE second of the series of three Shaw Trust lectures on factory accidents was delivered at the Royal Society of Arts in London on March 4th by Mr. G. Stevenson Taylor, Deputy Chief Inspector of Factories, who dealt with the principal causes of accidents. Although in most modern factories artificial lighting is usually adequate, it is not always suitable and workers' eyes are subject to glare, while heavy shadows are sometimes cast on the work or across alleyways.

During 1933 in thirty industries there were 113,260 accidents, of which 688 were fatal. Of these, electricity was responsible for 346 (twenty-five fatal). The largest number occurred in engineering works (102 with two fatalities), followed by electricity generating stations (64 with seven fatalities).

Although the number of accidents due to electricity is a very small proportion of the total number of accidents from all causes, many of them result in serious injuries and the fatality rate is high. Thus in 1933 the fatality rate was over 7 per cent. About 40 per cent. of electrical accidents occur to skilled persons, and many occurring to unskilled persons are due to want of care or thought on the part of skilled persons. Unfortunately many persons, particularly electricians, consider that shocks at voltages up to 250 a.c. are not dangerous, and therefore take, and allow others to take, quite unnecessary risks with electrical apparatus at these voltages, whereas fatal shocks have occurred at much lower voltages. The result of a person coming into contact with live electrical apparatus depends mainly on the area of contact, the state of the skin, of the boots and the floor.

The largest number of accidents (eight fatal and ninety-eight non-fatal) occurred in connection with switchgear. Many of these were caused by lack of thought on the part of persons in supervisory or responsible positions. The next largest number of accidents (two fatal and fifty-one non-fatal) arose on cables and flexibles. Failure to maintain proper insulation, particularly where flexibles enter portable apparatus, was the principal cause of these accidents. Portable apparatus of various kinds is responsible for a large proportion of electrical accidents every year, and in 1933 there were three fatal and twenty-six non-fatal accidents due to such apparatus. Failure to provide or to maintain efficient earthing connections for the apparatus is the principal cause of these accidents, and in consequence of the difficulties of ensuring efficient earthing under all conditions of service, very low voltages are being increasingly used for operating portable apparatus and tools.

* * *

Long-lived Small Rectifiers

At an informal meeting of the Institution of Electrical Engineers in London on March 4th a discussion took place on "Small Rectifiers," being opened by three speakers. Each showed a number of lantern slides, illustrating the particular type of rectifier with which he was concerned, their application and performance charts. Mr. G. F. Bedford spoke of hot-cathode (or valve) rectifiers as small as 15A having a life of 15,000 to 20,000 hours; these are rapidly finding favour for battery charging, cinema operation and electric welding. Mr. S. A. Stevens, dealing with metal rectifiers, emphasised their extraordinary ubiquity, from minute sizes used for radio frequency detection up to capacities of 10,000 A for escalators and lifts. He claimed that by separate tappings of banks of units great flexibility was obtained. In addition, he urged their robustness and large overload capacity. For mercury-arc rectifiers as developed at present, Mr. H. Rissik said there was not such a wide application, but there were special services for which they were pre-eminent because of the principle of grid control which permitted infinite variation of output volts. Further, they enabled the practice, invaluable in some cases, of inverted transmission (in effect, d.c. to a.c.) to systems that required stand-by batteries for essential services. True flexibility, high efficiency and 15,000 to 40,000 hours' life were claimed for them.

A Symposium on Welding

As has previously been announced, a symposium on the welding of iron and steel is being arranged under the auspices of the Iron and Steel Institute in co-operation with fifteen other societies, on May 2nd and 3rd at the Institution of Civil Engineers. The matters to be dealt with are: present practice and problems at home and abroad; technique and apparatus; the metallurgy of welding; and specification, inspection, testing, and safety aspects. About 130 papers will be presented. Written discussions on the papers are invited and as the result of the information and experience to be disclosed it is hoped to draw up a report on the best means of organising future research.

On May 1st there will be an evening conversazione at the Science Museum, South Kensington, including a display of cinematograph films on welding, an exhibition of apparatus, and practical demonstrations of welding, with music and light refreshments. On May 3rd there will be a dance at Grosvenor House, Park Lane, with supper and cabaret performance. Forms of application for tickets, &c., should be completed as soon as possible.

The annual dinner of the Iron and Steel Institute is to be held at the Connaught Rooms on May 2nd.

Checking the Diameter of Fine Wire

In a recent issue of the *Elektrotechnische Zeitschrift*, Herr Richard C. Schmid describes the use of photoelectric cells for checking the regularity of the diameter of the fine wire used in radio receiving apparatus. Mechanical methods of checking have the drawbacks that the wire may become damaged and that the operator must be an expert in adjusting the tension and the pressure between the leading-in rollers. In the photoelectric method, which is in use at a Berlin wire factory where an accuracy of one-thousandth of a millimetre is stated to be attained, the wire is passed in front of a cell of constant width. To increase the sensitivity of the method, the wire is illuminated so that an enlarged shadow is caused to pass before the photo-electric cell. Any variations in diameter are observed by a galvanometer or they can be recorded on a travelling paper roll. If the speed of travel is adjusted to that of the wire, any faulty place in the latter can be quickly located. In order to secure an accurate record means have to be provided to prevent any vibration of the wire during its travel.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Helping " The Man Without a Job "

I feel that your very kind article " The Man Without a Job " calls for a reply from me, in particular with regard to the wide scope of the work of this Association. For instance, I wonder how many of your readers would like to have worked for sixty years in the electrical industry and, at the end of that time, to find their only source of income the old-age pension of 10s. per week ?

We have an old chap, to whom a pension has been given, who actually started work in the electrical industry in 1872 at the age of fifteen years, and in 1921, when his name was first brought before us, he was just existing in Rowton House and very rapidly going blind. We fixed him up with glasses and granted him a pension, and he promptly took advantage of this security of income to move into the country, where I know he is now comparatively happy.

Quite a different case was that of a member of our industry, reputedly quite a wealthy man, whose widow, on his sudden death, found herself practically without means. Her son still had two years to complete his education at school and this Association, with the help of others, arranged that this boy's education should be completed and, in fact, looked after him until, eventually, he could start in business himself.

These two cases are simple compared with the widow left with six very young children and no income. This Association kept the home going from 1922 until the last child was actually in a position to start work.

I am sure everybody will appreciate, if they read this letter, what a tremendous field our activities cover and how impossible it would be to replace them by any pension scheme or other method of insurance.

There is only one possible way to deal with every type of necessity which may arise, and that is to treat each individual case on its own merit; that is the aim and object of this Association.

J. T. KEEPING,
General Secretary,
Electrical Industries Benevolent Association.

March 8th.

9, Southampton Street, London, W.C.1.

E.D.A. Publicity Methods

The letter from Mr. D. Mills in your issue for March 1st is timely, and although personally I hold that co-operative advertising between manufacturers and dealers is not satisfactory, there does seem considerable room for some effort to be made by the Electrical Development Association to compete with gas propaganda.

The gas people are doubtless having to fight hard to maintain their sales, but this does not mean that the electrical industry should rest on its laurels. The great majority of housewives still believe that gas is the most economical and speedy method of cooking, a view in which they are strongly supported by the fact that gas facilities are more readily obtainable than electrical ones.

The exhibit of E.D.A. at the B.I.F. at Birmingham last year was feeble in comparison with the gas show. I hope that at this year's Fair in May E.D.A. will show itself alive to the fact that the public require showing what electricity can do and do better than gas, rather than rely on a glorified rest room which fails to encourage the majority to go near it.

J. BAGGS.

Manchester, *March 1st.*

Another Skilled Man's Plaint

I have read the remarks of your correspondent, Mr. Harry Rose, with sympathetic interest and I can quite understand a skilled man's feelings in these days of alleged advancement. To be a conscientious and skilled electrical engineer nowadays seems to be a decided disadvantage so far as monetary reward is concerned. The skilled engineer submits tenders for electrical installations that comply fully with the rules and regulations, while on the other hand, the handyman of the adventurer type is not concerned with rules and submits anything he can " get away with."

The regulations drawn up by the Wiring Rules Committee are very necessary and would serve an excellent purpose if there was any machinery in existence to enforce them. The National Register of Electrical Installation Contractors is also an excellent body whose objects are to protect respectable contractors and safeguard the electricity-using public. This Register has, however, no power to prevent inexperienced people from dabbling in electrical work and indeed some of these undesirables have the temerity to style themselves " registered " although they have not been admitted to the N.R.E.I.C.

Our weaknesses are therefore fairly obvious and until the various electrical bodies get together with the object of calling for legislation to enforce rules in connection with electrical installations in domestic property and public buildings, also for making registration compulsory, the skilled electricians, both employers and employés, will not come into their own. That is my solution to the existing difficulties. Would its attainment be difficult. I wonder!

ALEX MILNE.

Glasgow, *March 9th.*

The Purchase of Coal

The article by Mr. R. Wright in your issue of March 8th is interesting, but if the sampling and testing of coal are carried out by skilled persons, the large errors which he seems to fear need not occur. If the sample is usually placed in a " fairly dry tin " and free moisture retained by the tin is often neglected in the moisture determination, this would serve to indicate inexperience or carelessness on the part of the sampler and chemist.

The example given on page 342, of tests on three samples of coal taken during a boiler trial under the supervision of five specialist engineers, indicates something seriously amiss for the calorific values to differ by 760 B.th.u., the ash by 3.6 per cent. and the moisture by 2.9 per cent. In over twenty years' experience of fuel technology, which includes many official boiler tests, I have never met such an example, and had one occurred the engineers concerned would undoubtedly have demanded a repeat trial. The differences encountered between duplicate samples should not exceed 1.0 per cent. for calorific value, 0.5 per cent. for ash, and 0.5 per cent. for moisture.

For the buying of coal on the " as received " basis, accurate sampling and analysis are essential. Moreover, each fuel has to be classified according to size and suitability and some allowance made for moisture and ash content. Given this, the method is quite practicable. I would suggest perusal of the following publications: British Standard Specification No. 420, " Sampling and Analysis of Coal for Inland Purposes," and No. 403, Report of Drs. Grumell and Dunningham dealing with the theory of sampling based on experimental evidence.

A. B. OWLES,
Chief Chemist, Barton Power Station.

Manchester, *March 11th.*

The article on this subject in your issue of March 8th appears to have been written only to point out defects of the " as received " basis, and not to treat the matter on broad lines; there is very much to be said for this system of buying coal, or any other commodity. Had the word " sampling " been used, rather than " analysing and testing," then I would agree that discrepancies are likely to creep in.

Any chemist will guarantee his testing and analysis, but no one would guarantee that his sample was truly representative. This difficulty will arise whatever be the basis on which fuels are purchased. My experience has not been that colliery owners desire independent tests upon the fuel. The extraction of small samples at regular intervals over the period of unloading from each wagon does not entail much labour cost. The only real difficulty (?) is arriving at the free-moisture content, but if fuels are bought " as received " the free-moisture does not matter greatly except in so far as it affects the calorific value. If collieries accept the undertaker's test figures, the difficulty of retaining the free-moisture during transit of samples to other laboratories is obviated.

This shows the headquarters of the Isle of Thanet Broadcast Relay Service at Ramsgate floodlighted by projectors of various makes equipped with " Osram " lamps

I have not had any difficulty with fuel contractors or collieries, yet we have purchased all coals on the "as received" basis: nor have contractors ever doubted or queried test figures arrived at in our laboratory. A coal from the same seam and same pit varies from time to time, and the only just way of fixing the price is to strike an average over the full period of the contract, making any adjustment in the last payment.

The forwarding of samples to the colliery or independent laboratories for checking is quite futile; if collieries will not accept the undertaking's test figures, surely they will refuse to accept *samples* not taken by themselves.

I have found that all tenderers are quite agreeable to guarantee calorific value as received, ash-content, sulphur, and fusion point of ash, which is all that is necessary when a specification contains a clause to the effect that the fuel may be refused when, in the opinion of the engineer, it does not come up to the standard of the samples on which the contract is based. Further, they agree to the price being adjusted as the calorific value falls below 95 per cent. or the ash-content exceeds 105 per cent. of the guaranteed figures.

I fail to see how any colliery can give any close guarantee regarding sizing. It seems reasonable merely to state the class or size, and leave the question of the percentage of various meshes to be dealt with if the occasion arises. One can better judge the suitability of size after a lengthy trial under operating conditions. There cannot be any standard of the percentages retained by different sizes of mesh for any given fuel—no two are alike or similar in their characteristics when varying in size.

I cannot agree that a fuel with an ash-content of over 15 per cent. is a low-grade one; a fairly large ash-content is sometimes preferable to too low a content, particularly when running with short fires and over-air. Ash-content and calorific value are a good guide in selecting a fuel for *test*, and boiler tests should be run on the selected fuels as a final guide to purchase.

I should like to know the author's reason for saying that a coking coal cannot be burnt off properly owing to its burning in patches: patchy fires (cauliflowers) have been caused, in my experience, by caking coals or uneven wetting, in which case the fuel must be burnt off early, well under the arch.

March 11th. SQUARE PEG.

Mr. Wright's article raises an important question as to the most convenient method of recording the actual calorific value of fuel purchased. In the last three columns of the table comprising the performance of five grades of coal, standards are adopted which are not easy to remember and which involve unnecessary calculations. Long experience in the purchase and use of coal has convinced me that a better method of referring to coal quality is by means of the "standard coal factor"—briefly known as s.c.f. Standard coal is understood to be dry coal of 12,600 B.th.u. per lb. and the s.c.f. = (100 − moisture per cent.) × B.th.u. dry/12,600.

The s.c.f. after being recorded by the testing staff can be handed on to purchasing and accounting departments free from technicalities. From it they will readily ascertain that:—(a) The price of a standard ton of coal is the price "as received" divided by s.c.f. (b) The lb. standard coal per kWh is obtained by multiplying coal per kWh as received by s.c.f. (c) Thermal efficiency is 27.2 divided by lb. standard coal per kWh.

A much more attractive way of stating that coal contains 184,911 B.th.u. for a penny, as quoted by Mr. Wright, is to say that it costs 10s. per ton as received and 12s. 9d. per standard ton. Owing to the difficulty of obtaining a true sample of coal and the margin of error probable in a calorimeter test, a thermal calculation does not demand more respect than a ten-inch slide rule will afford, and to work it out to six significant figures as is done in this example is a waste of time.

From the five examples given by Mr. Wright the standard coal factor record would be:—

	1.	2.	3.	4.	5.
Price per ton	10/–	11/8	12/–	12/6	14/–
S.C.F.	0.786	0.840	0.946	0.96 5	0.89[illegible]
Price per standard ton	12/9	13/10	12/8	12/11	15/8

Figures as quoted in publications of the Electricity Commission as to lb. of fuel consumed per kWh generated are meaningless in the absence of further information as to the thermal value of the fuel. The standard coal factor method affords better information to non-technical committee-men, who can appreciate the relative value of coal tenders if the price per standard ton is quoted. Experience would suggest that not less than 200 tons of coal with deliveries extending over one month should be tested before the true s.c.f. is ascertainable. Generally it will be found that a much longer period for averaging this factor is available or can be secured in confidence from other coal consumers. F. W. DAVIS.

Hull, *March 11th.*

Work is in progress on the erection of three of the largest escalators in the world at the new Leicester Square Underground station

Safety in Theatres

In your issue of March 1st you suggest that constructive criticism from your readers would be helpful in connection with the recently published Home Office Manual of Safety Requirements in Theatres.

For a number of years I have given close attention to the question of safety lighting for cinemas and other places of entertainment. I have installed a number of different battery systems, but I have arrived at the definite conclusion that the best system available is the one which permits the storage battery to be trickle charged. This ensures that the cells are always kept in a fully charged state, ready to meet an emergency, and in addition much longer battery life is obtained under these conditions.

The emergency lights are normally fed from the mains, but when a public supply failure occurs, the battery is automatically connected to the emergency lights by means of a contactor switch. When the supply is restored the battery is disconnected from the load and the emergency lights connected to the mains again automatically.

I consider that such a system has the important advantage of eliminating the human element and that its use should be encouraged by the Home Office. It is not referred to in the Manual, but I venture to suggest that the Home Office should include it in the Cinematograph Regulations which you state are now being revised. S. HART, M.I.E.E.,

London, W.1, *March 6th.* *Chief Engineer,*
Gaumont British Picture Corporation, Ltd.

I would suggest that so far as safety lighting is concerned the Manual recently issued by the Home Office has omitted what is, in my opinion and experience, the most satisfactory system of safety lighting for any building.

The system which I have in mind is one which incorporates a storage battery which is normally kept in a healthy and fully charged condition by means of trickle charging, which compensates for open-circuit losses. The emergency lights are fed from the main supply, either directly or at a lower voltage, say, 100 V, through the secondary of a step-down transformer. Should the supply of electricity from the mains fail for any reason, a contactor switch on the control panel automatically connects the battery to the emergency lighting load. This system ensures that in all circumstances the emergency lights are illuminated when the public is present in the building and that the battery is in a fully charged condition to meet the *emergency*. In addition, when the battery is permanently trickle-charged a very much longer life is obtained from it than with other methods of operation.

The reliability of contactor switches is undeniable, as they are used universally by power stations, railway companies for signalling systems, &c.; in fact, there is scarcely any branch of the electrical industry where contactor switches are not employed. WM. MCINALLY, *Supervising Electrical Engineer.*
Associated British Cinemas, Ltd.

London, W.1, *March 6th.*

[Will the writer of the letter on "The Man Out of a Job" kindly send his name and address?—EDS., ELEC. REV.]

Public Lighting Engineers' Conference

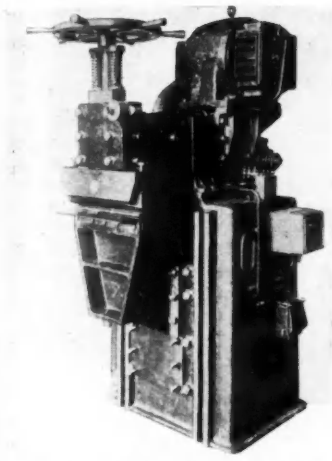
The twelfth annual meeting and conference of the Association of Public Lighting Engineers will be held in London from September 5th to 12th. The headquarters will be at the Hotel Metropole, W.C., where all meetings will take place. Further information can be obtained from Mr. J. S. Dow, hon. secretary of the Association, 32, Victoria Street, S.W.1.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

An Automatic Spot Welder

BRITISH INSULATED CABLES, LTD., Prescot, have recently supplied a large automatic spot welder with self-contained motor drive, fitted with special stakes for projection welding. The machine will weld together two pieces over a length of 16 in., ten spots being welded simultaneously.



The B.I. automatic spot welder (No. 90) with special electrodes for projection welding

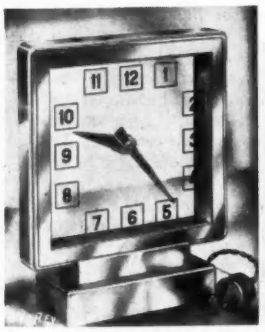
One of the parts to be welded has the usual depressions pressed in, corresponding to the place where the two parts have to be welded together, the other being left flat. They are placed in position, the machine is then set in motion by means of a push button, the two electrodes come together, and the current is switched on for a predetermined time, during which period all welds are upset. The current is then switched off, the electrodes opened, and the parts taken away. An output of twelve pieces a minute can be obtained, equivalent to 120 spots.

The welds produced in this manner are claimed to be more consistent than those made on the usual pedal-operated single-spot machine, as the results do not depend upon the skill of the operator.

Unusual Clocks

Two interesting developments in electric timepieces were shown at the British Industries Fair this year by SMITHS ENGLISH CLOCKS, LTD., Cricklewood Works, London, N.W.2. The first, known as the "Mystery" clock, has, to the inexperienced observer, no driving mechanism at all. Actually there is an a.c. synchronous movement in the chromium-plated base which drives a small vertical spindle in the centre of the bottom of the square frame. There are three layers of glass, the two outer ones being fixed and the centre one free to tilt a fraction of an inch. The revolving spindle drives this glass sideways, which takes the minute hand with it by friction. After a predetermined amount of movement the glass slips back and the operation commences all over again, but the hand is held in position by means of a ratchet. The hour hand is driven off the minute hand by means of a reduction gear. The simplicity of this design gives reliability almost equalling that of a standard synchronous clock.

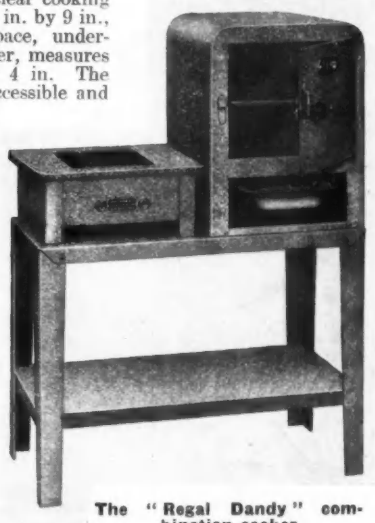
The "Mystery" and "Synfinity" clocks



The other new type of clock is the "Synfinity," designed to continue operation after the failure of the electricity supply. The actual driving is done by a spring mechanism which is corrected hourly and kept fully wound by a synchronous mechanism. Should the supply fail and put the synchronous clock out of action the spring will drive it for about six hours. A variety of faces and cases are available.

A Combination Table Cooker

MESSRS. C. HOUNSLOW & CO., 96A, Coleridge Street, Hove, have introduced the "Regal Dandy" combination table cooker which incorporates an oven and boiling plate on a metal stand fitted with a shelf. The oven, which is obtainable separately, is heated by a 750-W element and has a clear cooking space of 10 in. by 11 in. by 9 in., and the grilling space, underneath the oven proper, measures 10 in. by 11 in. by 4 in. The element is readily accessible and can be easily replaced by the user.



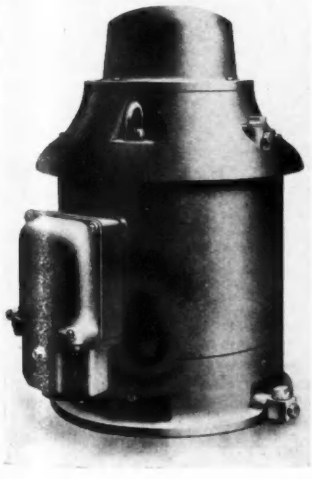
The "Regal Dandy" combination cooker

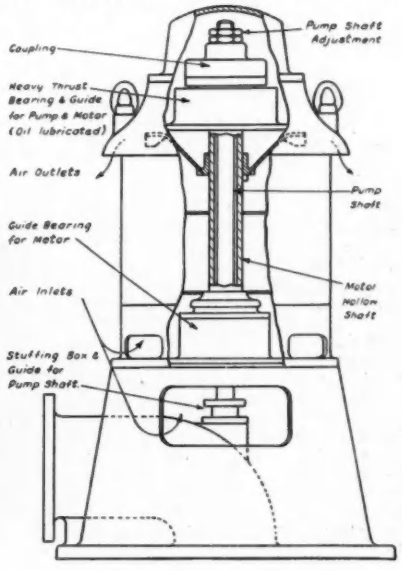
The boiling plate, which is fitted in a hob large enough to accommodate four large saucepans, has an enclosed type element controlled by two switches and giving loadings of 500 W, 1,000 W, and 1,500 W, the low loading being provided for simmering. It is designed to heat up rapidly and therefore does not retain its heat after being switched off. Each individual unit can be obtained separately. Sheet steel construction is used throughout and mottled grey stove enamel finish is standard. A small stand for the oven unit only is also available.

Hollow Shaft Pump Motors

A design of vertical spindle pump motor recently completed by the BRITISH THOMSON-HOUSTON CO., LTD., Rugby, to the special order of an export customer, and known as the Type GH, is built in sizes ranging from 15 to 60 h.p. at 1,500 r.p.m. The machine has heavy ball thrust capacity bearings that enable the total thrust of the pump to be taken by the motor. This, combined with the hollow shaft, enables a new form of drive to be adopted from which the top thrust bearing of the pump and the flexible coupling are eliminated, with the result that the motor stands on a much shorter and sturdier stool. The pump shaft runs through the hollow shaft of the motor into a coupling above the top motor thrust bearing. All adjustments to the pump clearances are made at the top of the motor, and the thrust bearing itself is easily exposed.

The 50 h.p. hollow shaft pump motor showing the construction





Should the motor be rotated accidentally in the wrong direction one of the line couplings will unscrew to an extent that will lift the top half of the coupling clear of the driving bottom half. The motor is designed for vertical pump duty only and has a smooth stream-line exterior which is absolutely drip-proof. The stator has taped end windings which are specially treated to withstand moisture and oil, and braced to withstand shocks of direct starting.

The primary design is double squirrel-cage to keep the starting current down, but it may also be built as a single squirrel-cage, with slightly higher efficiency.

D

The Electrical Wholesalers' Dinner

THE annual dinner of the Electrical Wholesalers' Federation was held on March 7th at the Savoy Hotel, W.C., Mr. J. F. Irvine, president of the Federation, occupying the chair. The toast of "The Federation" was proposed by Lord Eltisley, president-elect of E.D.A., who said this year saw the coming of age of the Federation, which had established itself as a successful organisation, much of which was due to the able manner in which Mr. A. Albrecht, the director, had devoted himself to the cause. He spoke of the coming National Electrical Convention—a great adventure, from which only good could come. Co-ordination and co-operation, which the Convention could not fail in promoting, was essential if the industry wanted to guard against Government control or other intervention.

Mr. J. F. Irvine, in responding, said that co-operation already existed in the industry and there was a spirit of give and take. Organised trading was technically sound. The work of the Federation was appreciated by the industry, and all branches came to it at one time or another with their difficulties. At last year's dinner the president had referred to the extension of retailing which he said could not be prevented, and it was in the interest of the industry that it should not be retarded. Since then the Federation had had the opportunity of surveying the extension of retail and wholesale trading, and statistics which had been compiled showed that there were approximately 150,000 retailers and 6,000 wholesalers in trades, other than electrical, now selling electrical goods and apparatus.

This extension was bringing difficulties in its train. Wholesalers and manufacturers were perplexed and no one knew what line of action to pursue. Many were working along a line of their own. Sustained progress could not be along these lines, and it was imperative to lay down basic principles for future guidance. Wholesaler distributors in other trades were seeking to obtain a status in the electrical trade, but could the electrical industry sustain an addition of 6,000 wholesalers?

Every day manufacturers were appointing traders outside the industry, and this must demoralise the whole scheme of distribution, to the detriment of manufacturers, factors and suppliers of electricity. These problems should be studied in a spirit of co-operation; the Federation was ready to accept its full share of the development of the electrical industry.

Coun. G. H. White, in proposing "Kindred Associations," said that there were fourteen of these associations represented at the dinner, and they were all working with the Federation in making the electrical industry the industry of the future.

Mr. W. Finlay (secretary and solicitor of the E.C.A. of Scotland) referred to the National Convention at which he hoped many problems would be solved and questions answered. It was better to have the industry rationalised from within, than by the Government from without.

Mr. J. Snow Huddleston (chairman of the C.M.A.), said that his Association first came into contact with the Federation seventeen years ago. Manufacturers, distributors and retailers must hold together to the best of their ability and the C.M.A. was always willing to uphold that idea.

Mr. J. W. Mayall (vice-president of the E.W.F.), proposed the President's health and Mr. Irvine suitably responded. A musical entertainment followed the speeches.

The Birmingham Electric Club

NEARLY 400 members and guests attended the twenty-fourth annual dinner of the Birmingham Electric Club, which was held last Friday at the Grand Hotel, Birmingham. Mr. J. H. Asdell, M.Sc., the president, occupied the chair, and the principal guests were the Lord Mayor of Birmingham (Ald. S. J. Grey) and Sir Stephen Tallents, K.C.M.G., Public Relations Officer to the G.P.O.

The first toast, "The City of Birmingham," was proposed by the president, who said that the diversity of trades in the city had kept it going well during a very difficult period. Birmingham was very fortunate in its government, which had attracted many men of outstanding ability.

In his reply, the Lord Mayor said that that gathering was larger than any he had seen for one single industry. It showed the importance of the electrical trade in the life of the city. The Lord Mayor's references to the history of Birmingham were most interesting, particularly the part which related to electricity supply. He said that in 1882 the City Council considered the matter and decided not to proceed as the project was too risky and experimental. The undertaking was eventually acquired in 1899 and had since had millions spent on its development. This expenditure, however, had proved a most remunerative investment.

Sir Stephen Tallents proposed the toast of "The Birmingham Electric Club." He confessed his almost entire ignorance of electrical matters, but said that his contact with the Post Office Engineering Department had led him to respect electrical engineers in general. There was never a time when Post Office engineers were more active in research and development; their efforts were being directed particularly towards the question of carrier telephony, and television would provide many more problems for them. He congratulated the Club on its great growth and healthy position.

Mr. Asdell, responding, mentioned that the formation of the Club was largely due to Post Office engineers, who also played a great part in the establishment of what was now the Institution of Electrical Engineers. The Club exemplified the cordial relationship which existed between all branches of the electrical industry in Birmingham. One of its objects was to encourage the interchange of views among its members and opportunities were provided for the younger members to express their opinions.

The president also made mention of the work of the Committee on behalf of members who were out of a position, and appealed to more fortunate members to consult the honorary secretary whenever they were looking for men. In the near future they hoped to co-operate with the educational authorities in advising boys upon their careers. They also hoped to institute small premiums for original papers contributed at the Club's meetings and to offer prizes and scholarships to evening students.

The health of the guests was proposed by Mr. W. E. Clark, vice-president, who, referring to Sir Stephen Tallents' work, said that he had shown that a Government trading department could be run on business lines. He also mentioned a number of guests by name, and gave a list of associations who had sent representatives to the dinner, and it was a very imposing list. Mr. Clark also said that the Club now had a membership of 400, and he believed it to be the largest electrical club in the country.

Councillor Canning, chairman of the city's Finance Committee, replied to the toast in humorous vein, and the speeches concluded with a brief tribute from the president to the hon. social secretary, Mr. J. W. Donovan, and his committee for the success which had attended their work in organising the dinner.

An excellent entertainment followed, and the reunion continued for some time afterwards.

The E.A.W. Conference

THE annual ball, with cabaret and supper, of the Electrical Association for Women is to be held at the Park Lane Hotel, Piccadilly, on April 12th. Tickets, one guinea each, are obtainable from headquarters at 20, Regent Street, London, S.W.1.

The tenth annual conference will be held in Manchester and Salford from May 8th to 11th, with headquarters at the Midland Hotel, Manchester. The programme is as follows:—

Wednesday, May 8th.—Evening, civic reception at the Art Gallery, Peel Park, Salford.

Thursday, May 9th.—Morning session at the Central Library, Manchester (open to the public), with papers by Mlle. Andrée Trolliet on "Domestic Electrification Progress in Switzerland" and by representatives from other countries. Following the official luncheon at the Midland Hotel, Manchester, there will be afternoon alternative visits to the Central Library, Rylands Library, or Chetham's Hospital. Tea will be served in the E.A.W. Manchester Club Room, and there will be a reception by the Lord Mayor at the Town Hall in the evening.

Friday, May 10th.—Morning, annual general meeting at the Central Library, Manchester, and presentation of president's membership cup. Afternoon, visit to the works of Ferranti, Ltd., Hollinwood, with luncheon and tea at the works. Evening, visit to the Rusholme Repertory Theatre.

Saturday, May 11th.—Morning, informal alternative visits to the cable works of W. T. Glover & Co., Ltd., Trafford Park, or to the accessories works of G. H. Scholes & Co., Ltd., Wythenshawe, with luncheon provided by the companies. In the afternoon the Wythenshawe Housing Estates will be visited, with tea at the invitation of the Manchester Electricity Committee.

Application forms (with conference fee of one guinea) must be returned not later than April 19th.

In the Courts

THE Court of Appeal, consisting of the Master of the Rolls and Lords Justices Slesser and Romer, on March 7th heard an appeal by the English Electric Co., Ltd., Stafford, from an award of Judge Ruegg, sitting as the arbitrator under the provisions of the Workmen's Compensation Act, in favour of Mrs. F. M. Keeley, Stafford, the widow of a workman who met with his death whilst in the company's employ.

Mr. Edgar Dale, for the appellants, said that on the day of the accident Keeley was engaged in testing electrical equipment at New Mills, Stockport, owned by the Central Electricity Board. One of the switches (No. 3) had been disconnected and wired for testing and made alive again, and Keeley proceeded to disconnect No. 4 switch. There was an explosion, and Keeley was seen on No. 3 switch, with flames about him, standing on a bar charged at 33,000 V.

The evidence was that Keeley had been told that No. 3 had been recharged, and if he was on No. 3 at the time of the accident, when his work on that switch had finished and his work for the time being was on switch No. 4, the appellants' contention was that the accident could not be held to have arisen out of, and in the course of, the deceased man's employment.

Without calling upon counsel for the widow, their Lordships held that there was evidence to support the award of the County Court Judge, and the appeal was dismissed, with costs.

The Master of the Rolls, in his judgment dismissing the appeal, said that it might well have been that Keeley had by mistake gone to switch No. 3, but even so it could not be said that the accident did not arise out of his employment. The evidence showed that Keeley was an experienced and very competent workman. The Lords Justices concurred.

The London Supply Merger: Trustees' Powers

In the Court of Appeal, consisting of the Master of the Rolls and Lords Justices Slesser and Romer, on March 7th, Mr. Evershed, K.C., applied for leave to expedite the hearing of an appeal from Mr. Justice Eve's judgment on the summons brought by the trustees under a settlement made by Mr. Henry Claude Walker asking for the decision of the Court on the question whether the trustees who held ordinary stock of the Westminster Electric Supply Corporation, Ltd., were empowered to concur in the proposed scheme to transfer to London Associated Electricity Undertakings, Ltd., the share capital of the Westminster undertaking.

This question was raised in its present form as a test case for the purpose of having it determined whether the scheme to transfer to the London Associated Electricity Undertakings, Ltd., the share capital of the Westminster undertaking and five other London electricity supply companies was an "amalgamation" within the meaning of Section 10 (3) of the Trustees Act, 1925. Mr. Justice Eve decided that the scheme was not an "amalgamation" within the meaning of the Act, and from this result certain of the beneficiaries under the settlement desired to appeal.

Mr. Vaisey, K.C., for the trustees, supported the application to expedite the hearing of the appeal. He said that the proposed scheme could not go through unless 90 per cent. of the shareholders in the contributing companies came into the scheme, and excluding those who were trustees the 90 per cent. might not be reached.

The Master of the Rolls said that having regard to the crowded state of the list he could not give an immediate date, but the appeal would be brought to the list as soon as possible.

False Customs Declarations

At the Mansion House, London, on March 7th Mr. F. J. Delbeke, a director, and Mr. A. Fielding, secretary at the material time, of the Britannia Electric Lamp Works, Ltd., Park Royal, appeared to answer charges of making false Customs declarations in connection with lamps imported from Belgium and Germany. Mr. J. Kovanda, the company's manager, was charged with fraudulently attempting to evade Customs duties. Messrs. Delbeke and Kovanda pleaded "Guilty" and Mr. Fielding "Not guilty."

It was stated for the Commissioners of Customs and Excise that duplicate invoices had been used, one set for the declaration of duties and the other set, showing higher values, for settlement purposes. It was further alleged that Kovanda had admitted smuggling spiralised tungsten wire into the country during 1932 and 1933. It was possible that in some instances the wire, in envelopes, had been placed in his pocket without his knowledge; he was summoned in respect of only one instance of which he appeared to have had knowledge.

Fielding said that he was only a salaried servant of the company at the time and he believed the declarations to be accurate. Counsel for Mr. Delbeke said that his client was ill when these matters occurred and he had no knowledge of them at all. He pleaded "Guilty," however, because he realised that it was his duty to know what was going on.

The magistrate, Alderman Sir Phené Neal, imposed a fine of £450 and 30 guineas costs on Mr. Delbeke; a fine of £100 on Mr. Fielding; and a fine of £50 on Mr. Kovanda.

Halford Radio, Ltd.

In the Companies' Court on March 11th Mr. Justice Bennett had before him a petition for the compulsory winding-up of the above company. Counsel said that this was a creditors' petition for £192 for royalties due under an agreement, and judgment had been signed in respect of the debt.

The company did not appear, and his Lordship made the usual compulsory order.

Winding-up Petition

A petition for the winding-up of Rotor Electric, Ltd., has been presented to the High Court by Messrs. Wilkins & Wright, Ltd., and will be heard in London on March 18th.

Parliamentary News (BY OUR SPECIAL REPORTER)

IN the House of Commons on March 6th Mr. Stourton asked the Minister of Transport if his attention had been called to the wide variation between 3d. and 8d. per kWh charged for lighting by the electricity companies in the Metropolitan area; and if, in the public interest, it was proposed to take steps to bring pressure upon the companies concerned to secure uniformity in charges to the consumer.

Engineers changing-over the Central telephone exchange, London, to automatic working last Saturday

Mr. Hore-Belisha said he was aware of the lack of uniformity between electricity supply undertakings, both municipal and company, as to methods and amount of charges throughout the Metropolitan area, although he was not aware of any company undertaking in this area whose charges for lighting alone were either so high or so low as those referred to. He would welcome in the public interest as wide a measure of uniformity as practicable, although, of course, it must be realised that charges in any particular case must depend on the nature of the demand and financial position of the undertaking.

Railway Electrification

On March 6th Mr. Hutchison asked the Minister of Transport whether the decision of the railway companies serving East London against electrification on the ground that it would not be a profitable investment was accepted as final by the London Passenger Transport Board.

Mr. Hore-Belisha said he was informed by the London Passenger Transport Board that while it was in agreement with the railway companies serving East London that owing to the great cost of widening the track, and the character of the traffic to be carried, it would not be a profitable investment to electrify the railways, the whole problem was having the careful consideration of the Standing Joint Committee.

Municipal Control of High-voltage Devices

On March 6th Miss Ward asked the Minister of Transport what representations he had received from local authorities deprecating their lack of control over the erection or installation of high-voltage electrical devices.

Mr. Hore-Belisha said if his hon. friend would give him information as to what high-voltage electrical devices she had in mind he would be very pleased to institute the necessary inquiries.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments. Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

The E.D.A. April Programme

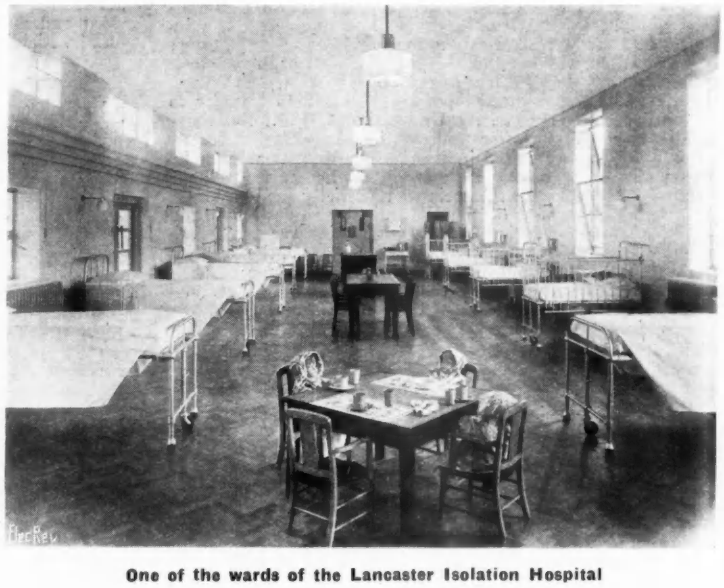
The April Sales and Publicity Programme of the British Electrical Development Association contains some advance details of the assistance which the Association offers to local authorities who are preparing schemes for the Jubilee celebrations. It points out that carnivals and processions will be more popular than ever this year, and the new E.D.A. processional car will be in great demand. Full descriptive details of this car will be given later, but in the meantime bookings are being rapidly made. A window display has been prepared to link up with the forthcoming Jubilee celebrations. The centre unit is wired to provide illumination of the portraits of the King and Queen, and an illustration of Windsor Castle in the foreground is fitted with a flasher, the suggestion being that a red-coloured lamp should be placed on one side, and a blue on the opposite side, to produce a colour-changing effect. Illustrations and a price list of publicity material for the E.D.A. talking films are given, and particular attention is drawn to the mechanical window display.

Cooking Demonstrations at Southampton

Following the success of the recent cooking demonstrations at Poplar, Mr. W. G. Turner, borough electrical engineer, Southampton, co-operated with the G.E.C. to stage similar demonstrations at the Chantry Hall, Southampton, during the first week of March. A special window display was arranged at the Electricity Department's showrooms to support the demonstrations.

The Lancaster Isolation Hospital

The front of the new isolation hospital of the Lancaster and District Joint Hospital Board is relieved by two large panel lighting fittings in bronze, specially designed by the General Electric Co., Ltd., and mounted high up on the face of the buildings. The lighting fittings throughout are of G.E.C. manufacture, and those in the ward blocks show how standard lighting units may be treated so as to harmonise with their surroundings. The main lighting consists of hexagonal "Britalux" units with chromium galleries and backplates fitted on metal rods finished in a cellulose-sprayed orange shade. Over each bed is a bracket with a "Britalux" cube, the stems of which are finished in orange. This finish imparts a pleasing brightness to the wards. G.E.C. installation materials were used throughout the hospital, including 21,000 ft. of "Silverlac" conduit and 16 miles of Pirelli-General cable, as well as the low-voltage main board, ironclad distribution boards, "Landor" switches, and over 450 lamps. A G.E.C. intercommunication telephone system and specially designed radio equipment, consisting of a superheterodyne circuit with a 12-W amplifier, are also installed. The installation was carried out to the instructions of Mr. E. Middleton, of the Lancaster Borough Surveyor's Department, by Messrs. Simpsons, of Lancaster.



One of the wards of the Lancaster Isolation Hospital

Labour Management

A conference to discuss the influence of the management of labour on production is being held at the Midland Hotel, Manchester, on March 22nd. The subjects to be discussed include the formulation of a definite labour policy and the practical effects of its application. The conference is being convened by the Institute of Labour Management, and the chairman will be Mr. A. P. M. Fleming, director of the Metropolitan-Vickers Electrical Co., Ltd. The speakers will include Mr. C. G. Renold, managing director of the Renold & Coventry Chain Co., Ltd., and Mr. Maxwell Woosnam, group labour officer, I.C.I. (Alkali), Ltd. Mr. J. Smith, labour and welfare officer, Beyer, Peacock & Co., Ltd., will open the discussion on the two papers.

Electricity in Waterworks

In view of the importance attached to automatic control of small waterworks and to remote indication of conditions in those of a larger type, a publication issued by Messrs. Evershed & Vignoles, Ltd., entitled "Distant Indication and Control for Water Undertakings," should be useful to those concerned in developing this load. As the primary appeal is to the water engineer, electrical questions are dealt with in a simple elementary manner. A number of circuit diagrams of actual installations are included which show what is being done as well as what could be done.

New Municipal Showrooms

The Middleton Town Council has approved a scheme, to cost £8,000, for a new electricity showroom and offices, and intends to advertise for tenders for the work. One councillor moved the reference back of the proposal of the Electricity Committee, stating that the cost of the site and the demolition of existing property would raise the total cost to £13,000. Councillor Gradwell said the present department was spread all over the town, a state of affairs which had been found to lead to inefficiency.

The Chilean Radio Market

A confidential report on the radio trade in Chile, from H.M. Consular Officers in Chile, has been issued by the Department of Overseas Trade to firms whose names are entered on its special register. United Kingdom firms desirous of obtaining a copy of the report should apply to the department at 35, Old Queen Street, London, S.W.1, quoting reference number A.Y.12933.

Increasing Refrigerator Sales

With the aid of a new model refrigerator which is to be publicly exhibited for the first time at the forthcoming Ideal Home Exhibition, Electrolux, Ltd., aims at making the present year a record one for sales progress. Last Friday about 130 distributing agents of the company toured the up-to-date Luton factory and a conference was held when ways and means of exploiting the market were discussed. In the evening the distributors were entertained to dinner at the May Fair Hotel, London. Mr. L. S. Hillson, general sales manager, in proposing the toast of "Our Distributors," said that the progress of refrigeration in this country would definitely be through the dealers. With the new model and other developments about to take place he believed that the company would increase its share of the market. That the field in this country had not yet been "scratched" was the view of Mr. J. Scrivener, managing director, who presided. In proposing the toast of "Refrigeration during 1935" he said it would help considerably in the campaign if statistics were available, as in America, of the general sales in the past year in order that an indication might be given of the wider demand. He added that he had asked the Electrical Development Association to help in this matter. Others who spoke included Mr. T. F. Lummus (Chichester) and Mr. J. P. Musgrave.

Registered Electrical Contractors

Applications for registration from the following were accepted by the Executive Committee of the National Register of Electrical Installation Contractors at its last meeting:—

Wright & Holliday, Hulme, Manchester.
Ray Electrical Co., Birmingham.
Over, R., Kingsway, Manchester.
Wallace, A., & Co., Stockport.
Harrison, H. W., Moss Side, Manchester.
Brookes, J. A., Gorton, Manchester.
James & Whiting, Newport, Mon.
Higgins, L., & Co., Longsight, Manchester.
Preston, S., Colne, Lancs.
Haley, H. S. (trading as J. Haley), Halifax.

At the same meeting, one application was withdrawn and eight were declined.

Recent Contracts

The English Electric Co. has recently received an order from the Portsmouth Corporation for nine double-deck trolley buses. The chassis will be of "A.E.C." manufacture and will be their standard four-wheel type, model 661T, the main wheel

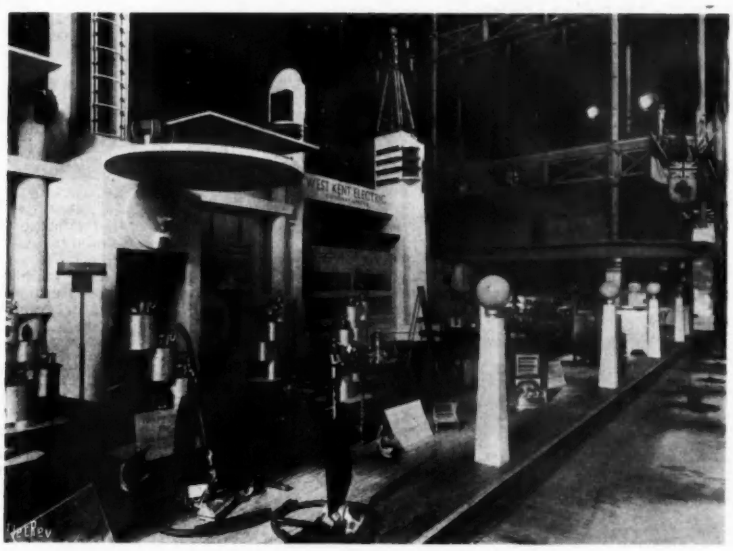
brakes being operated from a 5 cu. ft. capacity air compressor, driven by a ¾ h.p. English Electric compressor motor. The electrical equipment will be of the regenerative rheostatic brake type. The contactor panel complete with main starting field-shunting contactors, relays, the field-shunt resistance and the circuit breakers all being mounted in the driver's cab will be of the full-width type. The body will be of the double-deck all-metal construction type, seating fifty passengers, with a rear entrance. The interior lighting will be supplied from an l.t. 24-V motor generator lighting set, driven by an English Electric motor, the armature of which is mounted on the same shaft as the 24-V generator armature, the motor and generator being coupled together to form a single unit.

Among the plant recently supplied to various authorities by International Combustion, Ltd., are a stoker-fired boiler for the Briton Ferry Steel Co., secondary air equipment for Preston Corporation, an air heater for Bradford Corporation Electricity Department, and arch equipment for Stockport Electricity Department.

Batteries, Ltd., has recently secured a contract for the supply of 6,000 high candle-power alkaline miners' lamps to a Yorkshire colliery company.

South London Propaganda

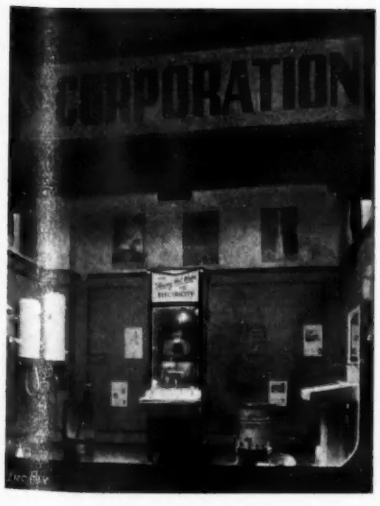
Quite appropriately, the stand of the electricity supply companies at this year's South London Exhibition for Home Lovers (Crystal Palace, March 6th to 16th) also contains a display by the Health and Cleanliness Council, which regards electricity as a dominating factor in the promotion of its ideals. Four associated supply companies are represented, namely, the County of London Electric Supply Co., Ltd., the South Metropolitan Electric Light & Power Co., Ltd., the South London Electric Supply Corporation, Ltd., and the West Kent Electric Co., Ltd. These show a wide range of domestic appliances, three demonstrators being engaged in explaining the merits of electric cooking instead of the usual one. In the centre there are examples of interior decorative lighting arranged by the Electric Lamp Manufacturers' Association, while the Electrical Association for Women plays its part in expounding the circuit layout of an electrical installation to those housewives who wish to know "how it works." Nearby, electric hair-waving and drying demonstrations are held, this departure appearing to be very popular. Although perhaps not the largest, the stand is, we think, the brightest in the exhibition, and the cheery glow from the electric fires permeates in all directions. Elsewhere, individual concerns display the latest designs of domestic equipment, notably vacuum cleaners, washing and ironing machines, cooking apparatus, &c. An interesting exhibit on the stand of the British Broadcasting Corporation is a large model of the new Droitwich transmitting station.



The London electricity supply companies' stand at the Crystal Palace

Water-heating at Halifax

The Halifax Corporation Electricity Department has during the past few weeks occupied additional temporary shop premises for showroom purposes, and the accompanying illustration shows one of the window displays dealing with electric water heating. As will be seen, the arrangement includes 1½, 3 and 12-gallon wall-mounted type water heaters on the left, while on the right is a self-contained "Reymez" wash basin which incorporates in its pedestal a small tank fitted with an immersion heater. The main feature of this show window is the central exhibit under the heading—"For Flowing Hot Water use Electricity." This display has been made up in the Department, and includes a stand to which is fitted a lavatory basin complete with taps and run-out. Inside the stand, as will be noted, is a copper cylinder for storage of the hot water, and this is coupled to the lavatory basin, the run-out water being collected by a small motor-driven pump in the base of the stand, and passed back again into circulation, the whole being fed from a ball tank fixed at the top of the stand above the cylinder. Two green pilot lamps are incorporated in the display working in conjunction with two immersion heaters fitted into the cylinder, one (top entry) at the top of the cylinder, and the other (side entry) being fitted towards the bottom of the cylinder, both being thermostatically controlled, while a large-sized dial heat-indicator is fitted into the centre of the cylinder towards the top, which indicates to the public the temperature of the water. The whole of the cylinder is covered in with lagging of the special type used by this undertaking. The window has attracted considerable interest. Included also in this display is a replica of the copper cylinders used in the district, with a portion cut away to indicate the method of fitting the immersion heaters (top entry) into the cylinder, while a 10-gal. wash-boiler is also on view, and towards the front of the window are different types of immersion heaters.



A Halifax water-heating display

Social Events

Over 500 representatives and friends of the motor and radio trades around Manchester attended the first Exide motor and radio dance held on March 4th at the Manchester Limited Restaurant.

The annual "Northmet" staff ball, organised by the Sports Association, was held on Friday last at the Corner House, Coventry Street, W. This popular function, which was attended by 500 members and guests, once again proved a great success, due in no small measure to the work of Mr. P. A. Thorogood, who was largely responsible for the arrangements. During the evening there were many surprise items in the form of novelties and "spot" prizes, while an excellent cabaret show was also given.

The first annual Rugby dance of the "Juno" Club (J. & P. Sports Club) was held at Charlton on March 9th, when eighty members and friends attended. A new Rugby fifteen encounters many defeats, but the "Juno" side to date has won six games and lost eleven of the seventeen played. During the evening Club colours were presented to Mr. J. Glover, the captain. A presentation was also made to Mr. R. F. Coysh, to whose hard work the success of the club is due.

On March 9th, the inaugural dinner of the Union Cable Co., Ltd., and Southern United Telephone Cables, Ltd., was held at the Robin Hood Hotel, Dagenham, about 230 members of the staffs and workpeople attending. Mr. F. W. Johns, who presided, referred to the extensions to the factory at Dagenham Dock, and Mr. J. Snow Huddleston spoke of the activities of the two companies and thanked all employés for their loyal co-operation. He then presented cups and medals to the winners of the various sections of the Sports Club. After dinner the hall was cleared for dancing.

Trade Announcements

Messrs. F. V. Williams & Co. have removed to 101, Southwark Street, S.E.1. Telephone numbers unchanged.

The Foster Engineering Co., Ltd., is removing its Manchester branch to 5, St. Mary's Parsonage, Manchester.

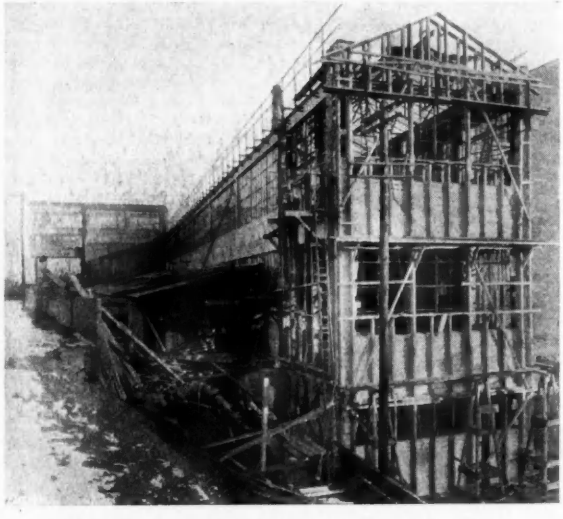
The Leda Electric, Ltd., is erecting a factory at Mitcham for the production of its commercial and domestic refrigerators. This will be additional to its works in Manchester.

A History of Cooking

In a lecture which he delivered before the Electrical Society of Glasgow on March 5th, Mr. F. G. Nesbitt, of the Simplex Electric Co., Ltd., traced the history of electric cooking. After a brief review of the development of electricity, he mentioned the display by Mr. H. J. Dowsing at the Crystal Palace Exhibition of 1891 of simple cooking devices made by Crompton & Co., and traced the growth of the cooker through its various stages. The lecture was illustrated by lantern slides, and ten speakers took part in the subsequent discussion.

Ferranti Works Extensions

The accompanying illustration shows work in progress on the extension of the Instrument and Clock Departments of Messrs. Ferranti, Ltd. This building, which is now nearing



Extensions in progress at Messrs. Ferranti's works

completion, is to be devoted entirely to precision work, a large proportion of it being provided with air locks to prevent the ingress of dust.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances.

CHEMICALS, ETC.	Price, March 13th.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£19 15s.	—
a Potash, Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac T.N. ... ... per cwt.	£4 18s.	—
a Sulphur Commercial... ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3¼d. to 3⅜d.	—
a ,, Crystals... ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d. nett.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil... ... ,,	1/2 to 2/9	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£201	£3 inc.
Grade II ... ... ,,	£138	£2 inc.
Grade III ... ... ,,	£71	£1 inc.
c Brass (rolled metal 2" to 12" basis)... per lb.	6¾d.	—
c ,, Tubes (solid drawn) ... ... ,,	8⅞d. to 9d.	—
c ,, Wire, basis ... ... ,,	7d.	—
c Copper Tubes (solid drawn)... ... ,,	9½d.	—
g ,, Bars (best selected)... ... per ton	£58	£2 inc.
g ,, Sheet... ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£30	—
d ,, ,, Wire Rods ... ,,	£34 5s.	—
d ,, ,, H.C. Wire ... per lb.	6 1/16d.	—
f Ebonite Rod ... ... ,,	1/6 to 2/—plus	—
,, Sheet ... ... ,,	1/3 to 1/6—10%	—
n German Silver Wire ... ... ,,	2/5	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para-fine ... ... ,,	4⅛d.	—
i Iron, Pig (Cleveland No. 3)... ... per ton	62/6	—
i ,, Wire galv. No. 1, P.O. qual. ... ,,	£20	—
g Lead, English Pig ... ... ,,	£12 10s.	5s. inc.
g Mercury ... ... per bot.	£11 10s. to £11 15s.	—
e Mica (in original cases) small ... per lb.	6d. to 1/–	—
e ,, ,, medium ... ,,	5/– to 10/–	—
e ,, ,, large ... ,,	10/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1	—
p ,, ,, drawn bars & rods ,,	10¾d.	—
p ,, ,, rolled strip & sheet ,,	10¼d.	—
p ,, ,, wire ... ... ,,	11⅛d.	¼d. inc.
o Platinum ... ... per oz.	£7	—
d Silicium Bronze Wire ... ... per lb.	7½d.	—
r Steel, magnet, in bars ... ... ,,	7½d.	—
g Tin, Block (English)... ... ... per ton	£218 to £220	£3 5s. inc.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	3/8	—

Quotations supplied by :—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons
f India-Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g Henry Gardner & Co., Ltd.
h Edward Till & Co.
i Bolling & Lowe.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. F. Dennis & Co.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead and rubber, up to the time of going to press, are given in our "Business Notes" under the same heading.

New Catalogues and Lists

Rhodes, Brydon & Youatt, Ltd., Gorsey Mount Street, Stockport.—A new pamphlet on "Mopumps."

Metropolitan-Vickers Electrical Co., Ltd., Bush House, Aldwych, W.C.2.—A card giving particulars of the London stock of electrical motors and control gear.

Benjamin Electric, Ltd., Brantwood Works, Tariff Road, Tottenham, N.17.—A comprehensive booklet on artificial lighting in laundries.

Hardypick, Ltd., Sheffield.—Leaflets on a laboratory coal-grinder and tool re-sharpening machine.

British Electric Domestic Appliances, Ltd., 3, Hanover Court, Moor Lane, E.C.2.—Particulars of a new "Bedal" refrigerator.

Ferranti, Ltd., Hollinwood.—A booklet giving a full technical description, with diagrams, of a.c. overcurrent relays.

Wollaston Gas Producers (Manchester), Ltd., Tib Lane, Cross Street, Manchester, 2.—A brochure on a producer furnace for steam raising.

Higgs Motors, Ltd., Witton, Birmingham.—Catalogues of loom motors, induction motors and battery charging sets.

Franco-British Electrical Co., Ltd., 25, Oxford Street, W.1.—A booklet on decorations for the forthcoming Jubilee.

Geo. Bray & Co., Ltd., Leeds, 2.—A leaflet on "Chromalox" finned strip heaters.

J. Blakeborough & Sons, Ltd., Brighouse.—A booklet on electrically operated sluice valves.

British Aluminium Co., Ltd., Adelaide House, King William Street, E.C.4.—Booklets on aluminium sheet metal working, welding and soldering, and aluminium finishing processes.

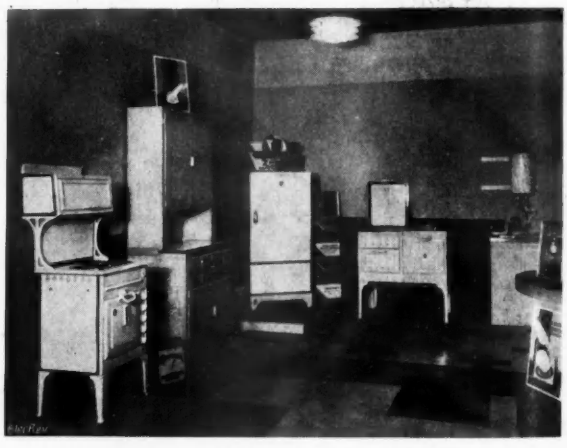
Wholesale Fittings Co., Ltd., 23, Commercial Street, E.1.—A sixty-four-page illustrated catalogue of lighting fittings for commercial and industrial use, and a supplement on Jubilee lighting.

Falk, Stadelmann & Co., Ltd., 83, Farringdon Road, E.C.1.—A catalogue of Jubilee illumination devices.

W. T. Henley's Telegraph Works Co., Ltd., Holborn Viaduct, E.C.1.—A revised edition of a catalogue on loop-in service cut outs.

Bankruptcy Proceedings

P. J. White & Co., general merchants, 5, Dyer's Building, Holborn, W.C.—An application was made on March 5th to Mr. Registrar Mellor at the London Bankruptcy Court for an order of discharge on behalf of P. J. White, who carried on business as above and failed in March, 1927. The Official Receiver reported that the ranking liabilities amounted to £2,895 and the assets, valued by the debtor at £2,640, had realised only £46. In September, 1919, he registered P. J. White & Co., Ltd., to deal in goods obtained from the Munitions Disposal Board.



A display by Messrs. Moffats, Ltd., at the Building Centre, New Bond Street, W.

That company went into liquidation in January, 1924. The debtor formed Radio Equipment Co., Ltd., in July, 1922, and acted as a director of that concern at a fee of £500 per annum until it went into compulsory liquidation in March, 1926. Then in October, 1923, he formed Radio Works, Ltd., of which he acted as a director until it went into voluntary liquidation in February, 1926. The debtor, in February, 1925, obtained an order from a British company, acting for a German company, for 5,000 gross yards of electric flex at the price of £2,600, but the purchaser was unable to take up the flex and to difficulty experienced in connection with that transaction the debtor attributed his failure and insolvency. After hearing Mr. Tindale Davis in support of the application his Honour suspended the discharge for twelve months.

L. W. Cole, 68, Chadacre Road, Stoneleigh, Ewell, late of Epsom, electrical contractor.—The public examination herein took place recently at Croydon. Debtor said that his liabilities amounted to £721, and there was a deficiency of £650. He commenced business in January, 1934, without capital, but arranged for accommodation at the bank and secured credit up to £400 for the supplying of materials. He executed contracts in the district, on which losses were sustained. In September last year negotiations were commenced for the merging of his business with another, but those arrangements fell through. In October he obtained employment as a traveller. He attributed his failure to excessive overhead charges and losses caused by under-estimating. The examination was concluded.

H. Gallie, Tidworth Market, Tidworth, wireless accessory dealer.—This debtor's public examination took place recently at Salisbury. The gross liabilities were £469, of which £368 was expected to rank for dividend. There were assets of £142. The failure was attributed to depreciation of stock during the past two years, severe competition, and inability to dispose of second-hand sets taken in part exchange. The examination was concluded.

W. A. Jolly, trading as the Globe Equipment Co., 36, Foleshill Road, Coventry, dealer in wireless parts and accessories.—This debtor's public examination was held at the County Hall, Coventry, on March 6th. It was stated that the liabilities amounted to £309 and there were assets of £80. Debtor attributed his failure to bad trade and ill-health. The examination was closed.

Lloyd Electric Lamp Co., wholesale electrical accessories dealers, 8, Rangoon Street, E.C.3.—Receiving order made March 6th on a creditor's petition. First meeting March 19th, and public examination May 10th, both at Bankruptcy Buildings, Carey Street, W.C.

J. H. Peacock, wireless retailer, Cornmarket, Pontefract.—Trustee, Mr. B. S. Briggs, 13, Burton Street, Wakefield, Official Receiver, released March 5th.

C. E. Keates, electrical and mechanical engineer, 110, Brent Street, Hendon, N.W.—Last day for receiving proofs for dividend March 22nd. Trustee, Mr. W. A. J. Osborne, Balfour House, Finsbury Pavement, E.C.

W. B. Ralphs, electrical contractor, lately of 2, Mulgrave Road, Middlesbrough.—Receiving order made February 27th on debtor's own petition. First meeting March 15th at 80, High Street, Stockton-on-Tees. Public examination March 22nd at the Court House, Wilson Street West, Middlesbrough.

J. Keddie, electrician, 90, Leander Road, Brixton.—An order of discharge, subject to a suspension of eighteen months, was granted on March 7th at the London Bankruptcy Court to this bankrupt who failed in May, 1934, with provable debts of £373 and assets which have yielded £77.

D. J. Spire, electrical engineer, Market Place, Bourne.—Receiving order made March 1st on a creditor's petition. First meeting March 19th at 41, Sidney Street, Cambridge. Public examination April 11th at the Law Courts, Peterborough.

R. D. Cooper, wireless engineer, 5, Cambridge Terrace, Heighington, Co. Durham.—First meeting March 15th at 80, High Street, Stockton-on-Tees. Public examination March 21st at the Court House, Stockton.

H. Hillier-Brook, radio engineer, 4, Market Street, Otley.—Last day for receiving proofs for dividend March 19th. Trustee, Mr. H. C. Bowling, 24, Bond Street, Leeds, Official Receiver.

H. Woodland, Jnr. (Warrington Radio Hospital), 206, Knutsford Road, Warrington.—Last day for receiving proofs for dividend March 20th. Trustee, Mr. J. Allcorn, Government Buildings, Victoria Street, Liverpool, Official Receiver.

J. C. Law, electrical and radio engineer, Alma Villa, Mark, Somerset.—Last day for receiving proofs for dividend March 19th. Trustee, Mr. H. Wheeler, 26, Baldwin Street, Bristol, Official Receiver .

H. V. Curtis, wireless and electrical engineer, 20, Trent Road, Brixton, S.W.—Receiving order made March 7th on debtor's own petition.

Private Arrangements

C. Morgan, trading as A. R. Morgan, 9, Newbridge Road, Llantrisant, electrical dealer, &c.—A conference of the principal creditors was held recently at the offices of Messrs. Poppleton & Appleby, 35, Windsor Place, Cardiff. The statement of affairs showed ranking liabilities of £1,109 and on the basis of a going concern there was a surplus of £106. It was reported that the business was commenced in November, 1931, by the debtor in partnership; the partner took no active part in the business, and a dissolution took place in February, 1934. It was decided that the debtor should execute a deed of composition to Mr. L. S. Findlay to provide for payment of the creditors' claims over a period of twelve months. A committee was also appointed.

Company Liquidations

Corey Parsons & Co., Ltd., Sumner Road, Peckham, London, S.E.15, radio and electrical instrument dealers.—The statutory meeting of creditors was held recently, when Mr. W. H. Sayers, a director, presided. The statement of affairs submitted showed liabilities of £29,007, of which £14,305 was due to the trade, and there were loan creditors for £6,777, the bank overdraft amounted to £6,796, and taxes and wages accounted for £1,125, net assets of £1,470. leaving an estimated deficiency, subject to the costs of liquidation and receivership, of £27,537. It was stated that a debenture was created in June, 1932, in respect of cash advanced. The company was incorporated in June, 1932, with a nominal capital of £1,500 with the object of supplying wireless sets to a cigarette manufacturing firm in connection with coupon gift schemes. As the result of these schemes being withdrawn the company's business declined considerably. However, it anticipated securing a large contract, and advances were obtained to enable them to continue trading. In September last year the company secured a contract under which it was to be the sole manufacturers of wireless sets for a certain firm, which would take between 15,000 and 20,000 sets during the season. The contractors, however, took only 2,000 sets, and that, together with the general depression in the trade since last Christmas, had contributed to the present position. The shareholders of the company had met previously and passed a resolution nominating Mr. C. H. Appleby, C.A., 34/36, Oxford Street, W.1, as liquidator. The creditors confirmed the voluntary liquidation of the company, with Mr. Appleby as liquidator. A committee of inspection was also appointed.

Shalless & Evans, Ltd.—Winding up voluntarily. Liquidator, Mr. W. A. J. Osborne, Balfour House, Finsbury Pavement, E.C. Particulars of claims to the liquidator by March 26th.

Fort Radio, Ltd.—Particulars of claims by April 6th to the liquidator, Mr. F. W. Inns, Finsbury Court, Finsbury Pavement, E.C.

Lumena, Ltd.—Meeting April 10th at Orchard Chambers, Church Street, Sheffield, to receive an account of the winding-up by the liquidator, Mr. A. W. Macredie.

All-Electric House Co., Ltd.—Meeting April 15th at 83, Colmore Row, Birmingham, to receive an account of the winding-up by the liquidator, Mr. H. Keeling.

Dissolution of Partnership

Myles & McCaffery, electrical engineers and contractors, 5, Dickson Road, Blackpool.—Messrs. T. Ramsden & C. B. Moore have dissolved partnership.

Argentine Electrical Trade

Competition in 1933

REFERENCE has been made in these columns recently to the improving tendency in Argentina's foreign trade, a tendency by which the United Kingdom stands to benefit under the mutually advantageous Roca agreement which was concluded between the two countries. In the circumstances particular interest attaches to the volume which has just been issued by the Government Statistical Department at Buenos Aires giving in detail the value of import and export trade in 1933 and enabling the British exporter to see the nature and extent of the foreign competition that he has to face.

The following table contains extracts from this volume showing the values of the imports of the chief groups of electrical goods, together with the countries of origin, and a note of increase or decrease compared with 1932. These are in accordance with the valuations of the Argentine Customs Department (15 pesos = £1).

	1933. Peso (Thous.)	Inc. or dec. Peso (Thous.)
Accumulators and cells—		
Total	1,388	− 390
From Germany	146	− 37
„ Canada	113	+ 36
„ United States	780	− 529
„ United Kingdom	278	+ 151
Batteries—		
Total	732	− 226
From Germany	22	− 44
„ United Kingdom	53	− 12
„ Denmark	97	− 85
„ United States	555	− 84
Ammeters and voltmeters—		
Total	67	+ 20
From Germany	23	+ 11
„ United States	26	+ 14
„ United Kingdom	7	− 2
Radio-telephone apparatus—		
Total	1,770	− 292
From Germany	242	+ 35
„ United States	1,290	− 483
„ Holland	76	+ 16
„ United Kingdom	113	+ 102
Receiving sets—		
Total	2,717	+ 1,329
From Germany	63	+ 29
„ United States	1,986	+ 964
„ Hungary	256	+ 243
„ Holland	355	+ 139
„ United Kingdom	31	− 52
Loud speakers—		
Total	46	− 143
From United States	25	− 135
„ Holland	17	− 3
Radio-telephone parts—		
Total	2,374	− 89
From Germany	215	+ 50
„ United States	1,914	− 171
„ Holland	69	+ 38
„ United Kingdom	81	− 20

	1933. Peso (Thous.)	Inc. or dec. Peso (Thous.)
Telephones—		
Total	173	− 75
From Germany	30	− 6
„ Belgium	34	− 44
„ United States	19	− 1
„ United Kingdom	80	− 2
Telephone materials—		
Total	131	+ 50
From Germany	86	+ 61
„ United Kingdom	19	+ 1
Circuit-breakers, switches, fuses, sockets, etc.—		
Total	1,033	+ 238
From Germany	616	+ 198
„ United States	185	+ 81
„ Italy	114	+ 64
„ United Kingdom	33	− 101
Insulating tape—		
Total	385	+ 77
From Germany	53	+ 8
„ United Kingdom	92	+ 25
„ United States	177	− 12
Incandescent lamps—		
Total	2,231	+ 204
From Germany	286	+ 47
„ United States	116	+ 1
„ Japan	1,003	+ 152
„ Holland	490	+ 209
„ United Kingdom	174	+ 20
House service meters—		
Total	3,453	+ 1,897
From Germany	2,241	+ 1,244
„ United States	469	+ 189
„ France	218	+ 19
Insulating tubes—		
Total	774	− 53
From Germany	571	− 98
„ United States	85	+ 31
„ United Kingdom	112	+ 17

	1933. Peso (Thous.)	Inc. or dec. Peso (Thous.)
Electrical materials (unspecified)—		
Total	1,660	− 276
From Germany	610	− 128
„ United States	181	− 226
„ Italy	165	+ 4
„ United Kingdom	119	+ 20
„ Sweden	108	+ 17
„ Switzerland	62	− 138
Motors and dynamos—		
Total	1,446	+ 9
From Germany	328	− 177
„ United States	345	+ 203
„ United Kingdom	275	− 52
„ Sweden	268	+ 38
Fan motors—		
Total	120	+ 50
From Germany	16	+ 15
„ United States	65	+ 9
„ Italy	27	+ 27
„ United Kingdom	12	—
Electric cables—		
Total	2,094	+ 233
From Germany	676	+ 256
„ United States	418	+ 200
„ United Kingdom	703	+ 171
Underground cables—		
Total	4,011	+ 527
From Sweden	241	+ 238
„ Germany	3,403	+ 1,693
„ Italy	15	− 1,294
„ United Kingdom	49	− 95
Telephone cables of iron or steel, covered with cotton, rubber, etc.		
Total	157	+ 138
From Canada	58	+ 43
„ United States	44	+ 44
„ Norway	55	+ 55
Accessories for underground cables—		
Total	80	− 40
From Germany	18	− 18
„ United Kingdom	45	+ 27

Electricity Supply

Lighting, Domestic, Power

Aldershot.—CHEAPER ELECTRICITY.—The Town Council has reduced the "unit" charge under the domestic and business two-part tariffs from ¾d. to ⅝d.

Ayr.—HOUSE WIRING.—The Finance Committee has approved the installation of electric lighting in houses at Auchinleck, New Cumnock and Mauchline, provided the tenants pay half the cost at the rate of 1s. per week. The total expenditure involved is £906.

Bala.—SUPPLY SCHEME.—The North Wales Power Co. is to supply the district with electricity.

Barrow-in-Furness.—NEW COOLING TOWER.—It is proposed to install a new cooling tower with forced draught fans at the power station in place of three existing towers, at an estimated cost of £2,000. The Electricity Committee is inviting tenders for the work to be carried out this summer.

EXTENSION TO ESTATE.—A supply is to be provided to 108 houses being erected on the Beacon Hill estate.

Birmingham.—£550,000 EXTENSIONS.—The Electricity Committee is seeking sanction to borrow £550,000 for extensions.

Blackpool.—REDUCED CHARGES.—The following reductions have been approved: Maximum demand indicator system (long hour consumers), minimum 1¾d. instead of 1¾d. per kWh; public lighting tariff, 1¼d. per kWh for the first million kWh and 1¼d. above, to be reduced to 1¼d. and 1d. respectively; tramway tariff to be reduced from 0.8d. to 0.75d. per kWh.

Bognor Regis.—NEW TARIFFS.—We are informed by Mr. H. A. Harding, electrical engineer and manager, that a new domestic tariff based on floor space and a business tariff based on the maximum demand, plus ¾d. per kWh, have been inaugurated as from the beginning of this year. The ordinary rates are: lighting 6d., power 1½d., and heating 1d. per kWh.

Boldon.—STREET-LIGHTING SCHEME.—A portion of West Boldon and Whiteleas is to be lighted by electricity instead of gas.

Brackley.—PUMPING STATION.—An automatic electrically driven pumping station is to be built in connection with a sewerage scheme.

Cambridge.—COMPANY'S OFFER ACCEPTED.—The Council has decided not to apply for consent to exercise its option to purchase the undertaking of the Cambridge Electric Supply Co., but to accept the offer of the company of an immediate reduction in the price of electricity from 6d. to 4½d. per kWh.

Cannock.—EXTENSIONS.—The Urban District Council proposes to extend mains a total distance of 9¾ miles at a cost of £7,954 to supply Bednall Acton, Trussell, Dunston, Coppenhall, Butterhill, Levedale, Mitton and Congreve.

Cardiff.—LOAN.—The Electricity Committee is seeking sanction to borrow £75,000 for cables and services.

NEW SUB-STATIONS.—It is proposed to erect a number of new sub-stations. The cost is estimated at £8,995.

Cheltenham.—MUNICIPAL CONTROL TO CONTINUE.—The Town Council has rejected the offer of the West Gloucestershire Power Co. to purchase the electricity undertaking.

Chesham.—SCHOOL LIGHTING.—The installation of electricity in five schools at Chesham is being considered by the Bucks Education Committee.

Chester.—FLOODLIGHTING.—It is proposed to carry out an extensive scheme of floodlighting under the direction of the electrical engineer (Mr. S. E. Britton), the buildings to be illuminated including the cathedral, castle and town hall.

Chesterfield.—SUB-STATION.—The Electricity Committee is to provide a sub-station in the New Beetwell Street area at a cost of £4,737.

Crewe.—EXTENSION.—The Town Council proposes to extend its mains to Wistaston Green and has applied for a loan of £1,700 for the purpose.

STREET LIGHTING.—Suspended lamps for public lighting are to be provided for certain streets at a cost of £500.

Dartford.—NEW CABLES.—The West Kent Electric Co., Ltd., has informed the Rural Council of its intention to lay an e.h.v. cable at Darenth and a l.v. cable at Swanley Junction.

Doncaster.—CHURCH SUPPLY CHARGES.—As from April 1st the Corporation has agreed to supply electricity to churches and chapels for lighting and power purposes at a flat-rate charge of 2d. per kWh.

Duffield.—VILLAGE ELECTRIFICATION SCHEME.—The local electricity supply company is preparing an electrification scheme for North and South Duffield, Wressle, Breighton, Skipworth and Bubwith, and all the villages are to be canvassed.

Eastbourne.—STREET LIGHTING.—The tariff for street lighting has been further reduced to 1.5d. per kWh, and is estimated to effect a further saving of £1,354 in the estimates for the present year.

RURAL EXTENSIONS.—The Electricity Commissioners are being asked to sanction a loan of £20,000 for rural area extensions.

East Ham.—MAINS EXTENSIONS.—The Electricity Committee recommends mains extensions costing £16,619.

France.—ELECTRICITY DISTRIBUTION.—Our Paris correspondent reports that, by a decree of the Minister of Public Works, the Société de Distribution d'Electricité de l'Ouest has been authorised to build a transmission and distribution system to cover seven districts to the west of Paris. Transmission is to be at 90,000 V, and distribution at 5,500 to 15,000 V.

NEW HYDRO-ELECTRIC POWER STATION.—The Société de l'Energie Electrique de la Moyenne Dordogne, of Clermont-Ferrand, has recently secured a concession to establish a hydro-electric station to utilise a fall of about 270 ft. on the River Dordogne.

ELECTRICITY OUTPUT.—According to the *Revue Générale d'Electricité*, the 1934 output of the sixty-eight principal electricity undertakings, representing about 93.5 per cent. of the total production, amounted to 10,664,778,517 kWh as compared with 10,391,056,080 kWh in 1933, an increase of 2.63 per cent.

Fraserburgh.—STREET LIGHTING.—The Town Council has concluded an agreement with the Grampian Electricity Supply Co., Ltd., for electric street lighting in place of the existing gas lighting.

Fringford (Oxon).—SUPPLY ARRANGEMENTS.—The village will shortly have electrical facilities.

Glasgow.—MAINS.—New distributing mains are to be laid at a cost of £4,226.

Gravesend.—LIGHTING IMPROVEMENTS.—The Electricity Committee is to improve the lighting in High Street, Whitehill Road and Singlewell Road at an estimated cost of £610.

Hull.—SWITCHGEAR.—High-rupturing-capacity switchgear is to be installed at New George Street sub-station (£4,689).

India.—METTUR SCHEME SANCTIONED.—The Secretary of State has now sanctioned the Mettur hydro-electric scheme. The

An installation of 400-W "Sieray-W" electric-discharge lamps at the Goods Depôt, Paddington

plant will consist of four turbines, one of which will be spare, each having a capacity of 5,300 h.p. at 60 ft. head and 14,600 h.p. at 160 ft. head. The whole scheme will be completed in about three years. Major H. G. Howard, chief engineer for electricity, under whose guidance these extensive developments in electricity are undertaken, will shortly come to England to place the necessary orders for the machinery, after personally inspecting the works of the leading firms in England and on the Continent.

Keighley.—BULK-SUPPLY CHARGES.—The scale of flat-rate charges in the standard a.c. bulk-supply agreement will include the following as from April 1st: From 70,000 to 130,000 kWh per annum at 0.9d. per kWh, and 130,000 to 200,000 kWh at 0.85d. per kWh.

EXTENSIONS.—The Electricity Committee is to extend mains at an estimated cost of £3,631.

Liverpool.—LOAN FOR NEW PLANT.—Borrowing powers for £21,750 are being sought by the Electric Power and Lighting Committee for the provision of reactors and switchgear at the Clarence Dock power station, together with explosion pots on existing auxiliary gear and building steelwork, &c.

Lowestoft.—LOANS FOR EQUIPMENT.—Application has been made by the Town Council for sanction to loans of £3,500 for additional transformer plant and £1,500 for plant for completion of the ring main.

Luton.—PROPOSED STREET-LIGHTING IMPROVEMENT.—The Town Council has applied for a loan of £1,334 for lighting Dunstable Road West by centrally suspended electric lamps. Twenty-one additional lamps are to be placed in Lea Road and Windmill Road (£483).

Maidstone.—ELECTRIC HOP DRYING.—The Town Council is to supply electricity for hop drying during the summer at 1d. per kWh.

DUPLICATE SUPPLY.—To provide a duplicate supply to the Bearsted district, mains are to be extended to connect with those of the Kent Electric Power Co.

Malton.—ELECTRICITY FOR COUNCIL HOUSES.—The Rural District Council proposes to install electricity in all Council houses where mains are within easy reach.

Manchester.—MONTHLY PROGRESS.—The Electricity Department's monthly report shows that there were 1,644 new consumers during January and 870 existing consumers applied for additional supplies, bringing the total to 2,514, representing 5,033 kW. Hired appliances connected during the period were: cookers, 196, wash-boilers, 17, and water-heaters, 34.

LOANS.—Loans of £1,800 for building works and £18,200 for transformers and switchgear for Benchill sub-station are to be applied for by the Electricity Committee.

Methil (Fife).—ELECTRIC LIGHTING FOR COUNCIL HOUSES.—Electric lighting is to be installed in the 500 houses which the Town Council is building. A petition has been received from the tenants of older housing schemes, where only gas has been installed, asking to be included in the Council electrification scheme.

Nelson.—SUPPLY TO NEW DISTRICTS.—Permission is being sought by the Electricity Committee to supply Barley, Roughlee and Newchurch. The charges will be: lighting, 7d. per kWh, and power (domestic), 2d. per kWh.

Newmarket.—HOUSE WIRING.—The Rural District Council has accepted the offer of the Bedfordshire, Cambridgeshire & Huntingdonshire Electricity Co. to wire houses at Bottisham, Swaffham Bulbeck and Swaffham Prior.

Oxford.—A REVISED TARIFF.—Particulars of a new scale of charges to be introduced on April 1st have been sent to us by Mr. H. G. Fraser, city electrical engineer and manager. During the summer quarters the two-part tariff "unit" charge is to be reduced from 0.5d. to 0.33d., and the business tariff will consist of a standing charge of £12 (£13 10s.), and ½d. per kWh (¾d.). The heating flat rate is to be 1d. (1¼d.) and the charge for power up to 3,000 kWh per quarter is to be reduced by ¼d. The prepayment lighting rate will be 6d. (6½d.).

Reading.—REDUCED CHARGES.—Reductions in electricity charges representing a concession of £20,000 a year to consumers have been approved by the Town Council.

Retford (Notts).—EXTENSIONS.—The Town Council has decided to spend £20,000 in extending the electricity supply so as to complete the ring round the Corporation's area.

Rochester.—MORE STREET LAMPS.—Ninety additional street lamps are to be provided in the added portions of Strood Extra and Frindsbury Extra, and forty more in Rochester and Strood.

Sale.—APPEAL AGAINST JUDGMENT.—The Council has decided to apply to the Court of Appeal against judgment regarding the arbitration award between the Council and the Altrincham Electric Supply, Ltd., over the price to be paid for the Ashton-on-Mersey electricity undertaking. It was stated at a meeting of the Council that, by reason of the low rate of interest at present charged on capital, the purchase of the undertaking, even at the price of £109,924, would not occasion an increase in the charge for electricity in the district or in the general rate.

Salford.—SUB-STATION SITES.—The Electricity Committee has acquired sites at Broughton and Prestwich for the erection of sub-stations.

Sheffield.—NEW COOKERS.—It is proposed to replace the cooking ranges in fourteen ward kitchens at the city general hospital by electric hot cupboards and boiling plates at a cost of £311.

EXTENSION OF POWER STATIONS.—Sanction has been obtained to borrow £60,000 for buildings and civil engineering works; £95,000 for generating and steam-raising plant and foundations in respect of the extension of the Blackburn Meadows and Neepsend generating stations; and £10,344 for e.h.v. switchgear at Blackburn Meadows station.

MAINS EXTENSIONS.—The Electricity Committee has authorised mains extensions costing £18,876.

South Africa.—A PROSPEROUS UNDERTAKING.—Mr. L. L. Horrell, city electrical engineer of Pretoria, reports that the profits of the Department from July to November last amounted to £27,033, which is £8,403 more than anticipated. In consequence, reductions in tariffs are proposed.

PORT ELIZABETH EXTENSIONS.—The municipality is raising a large loan, part of which will be used for extensions to the electricity supply undertaking.

NEW SCHEMES.—The Provincial Administrator has sanctioned the construction of the proposed electricity scheme at Prieska, Cape Province, which is to be undertaken in conjunction with a water scheme.

Southampton.—STREET LIGHTING.—Mr. W. G. Turner, the borough electrical engineer, informs us that the Electricity Department has adopted the policy of automatically renewing all lamps which have burnt for over 900 hours.

Southend-on-Sea.—TRANSFORMERS.—The Town Council is to erect and equip four transformer stations in the Leigh area at a cost of £3,100.

Spain.—THE ELECTRICAL INDUSTRY IN 1934.—We have received from the Department of Overseas Trade the translation of an article published recently in *La Energia Electrica* in which it is stated that the continued deterioration in the industrial situation during 1934 checked the fairly steady increase of about 4 per cent. per annum in electrical consumption, and there was a considerable excess of generating capacity over requirements.

Stroud.—REDUCED CHARGES.—The Stroud Electric Supply Co., Ltd., has reduced the lighting flat rate from 7½d. per kWh to 6½d. and the "unit" charge on the two-part tariff from 1¼d. to 1¼d., with a reduction in the fixed charge.

Torquay.—INSTALLATION OF WATER HEATERS.—The Electricity Committee has approved the following scheme for the provision of water heaters where cookers are also installed: Wiring to be fixed from the cooker switch to the water heater; the water heater to be installed with tap adaptor; the inclusive charge for the purchase of the water heater and the installation to be £3 17s. 4d.

SUPPLY EXTENSION.—The Electricity Committee is to provide a supply to South Huish.

Tynemouth.—ORNAMENTAL ILLUMINATIONS.—A scheme for ornamental summer illuminations on the sea front, estimated to cost £2,000, is being considered by the Parks and Sands Committee.

Uppingham.—RURAL NEEDS.—The Rural District Council has written to the Ministry of Transport with a view to obtaining electricity from the Mid-Lincs Electric Supply Co., Ltd., to supply a number of villages in its area.

Wakefield.—DOMESTIC EQUIPMENT.—The Housing Committee has decided to install the following electrical appliances in new houses: Griller and kettle with two plugs, copper, radiator; and plugs on the landing and in the living room. In the smaller houses an electric copper and kettle only will be installed.

Wallasey.—ELECTRICITY CHARGES.—The two-part domestic tariff running charge is to be reduced during the two summer quarters by approximately 20 per cent. to ½d. per kWh.

Walthamstow.—STREET LIGHTING.—A recommendation to spend £3,904 on the replacement of existing electric lamps in Walthamstow by 171 lamps of the electric-discharge type has been adopted by the Council.

Weston-super-Mare.—REDUCED CHARGE.—The Weston-super-Mare and District Electric Supply Co., Ltd., has reduced the "unit" charge on the combined domestic tariff from 1d. to ¾d.

Wolverhampton.—NEW WORKS.—A feeder is to be laid from the Corporation power station to Shakespeare Street at a cost of £378, and a new sub-station built at Parkfield Road at a cost of £2,869.

FLOODLIGHTING.—Arrangements are to be made for the floodlighting of public buildings.

CHANGE-OVER.—The Tettenhall area is to be changed over to a.c. at a cost of £1,500.

More Jubilee Plans

DURING the Royal Jubilee celebrations the cathedral at Salisbury is to be floodlighted by the Salisbury Electric Light Co., which also intends to illuminate the power station and the adjoining weir. Schemes of floodlighting have recently been prepared at Lancaster, Pontefract and Chester. At Grimsby there will also be strip lighting; the Electricity Department has announced a tariff of ½d. per kWh for outside illuminations. Floodlighting of the parish churches is proposed at both Thame and Littlemore (Oxon.). At Newcastle (Staffs) the Town Council has asked the borough electrical engineer to submit estimates of the cost of floodlighting various buildings. A similar request has been made by the Uttoxeter Urban District Council. The Llandudno Council has asked the Commissioners to sanction decorative public lighting. The Harrogate local authority proposes to floodlight the principal buildings, and the valley gardens are to be illuminated by multi-coloured lamps. For illumination purposes at Bradford the Electricity Committee recommends a charge of ½d. per kWh during a period of four weeks, subject to the payment by the consumer of a minimum sum of £1 and to the department not being involved in any expenditure for the provision of additional service cables. At Tunbridge Wells ½d. per kWh is to be charged for electricity for schemes of decoration and floodlighting. The Colchester Town Council has approved proposals for floodlighting the town hall, the castle and the war memorial, festoon lighting, an illuminated fountain for the lily pool, and floodlighting of the rose walk in the park. Electricity will be supplied gratis from May 4th to 11th for the purpose of floodlighting and other exterior lighting of public buildings, while private lighting displays will be encouraged by the provision of a specially reduced charge.

Traction

Aberdare.—TRAMWAYS TO BE DISCONTINUED.—The Urban District Council has decided to cease to operate its tram services, the renewal of the tracks and the existing rolling stock being considered uneconomical.

Bolton.—TRACK RENEWAL.—The Transport Committee is to relay the tram track in Chorley New Road at a cost of £16,500.

Burnley.—DISPLACEMENT OF TRAMS.—The final change-over from trams to buses in the area covered by Burnley, Colne and Nelson Joint Transport Committee is expected to take effect on April 1st.

India.—RAILWAY ELECTRIFICATION.—The proposal to electrify the section of the Bombay, Baroda and Central India Railway from Borivli to Virar has received the approval of the Railway Standing Finance Committee. The gross outlay is estimated at nearly Rs.2,600,000.

Preston.—THE LONGRIDGE LINE.—In view of the new factory being opened by Messrs. Courtauld at Ribbleton, near Preston, there is a prospect of the L.M.S. Railway electrifying and reopening the Longridge line. The chairman of the Preston Electricity Department stated recently that the electrification would not demand great capital expenditure, and it would enable the employés to travel quickly into the centre of the town as well as helping the development of the Grimsargh, Ribbleton and Deepdale districts.

Russia.—MAGNITOGORSK TRAMWAY.—The first 6-km. section of the new electric tramway has been put into operation.

South Africa.—NEW LOCOMOTIVES.—Five double-bogie electric locomotives have been ordered from the Metropolitan-Vickers Electrical Co., Ltd., by the South African Railways for use on the lines now in course of electrification between Cato Ridge and Durban and between Glencoe and the Transvaal frontier at Volksrust. Inquiries are being made for the supply of a further twenty-three locomotives.

Sunderland.—OPPOSITION TO BILL.—The Durham County Council is opposing the Sunderland Corporation Bill which includes a proposal to construct a tramway from the borough boundary to Whitburn.

Communications

Australia.—FUTURE OF OVERSEAS COMMUNICATIONS.—A comprehensive scheme has been prepared by the Post and Telegraph Department under which the Federal Government would take over control of the overseas wireless, telegraph and telephone services. The overseas wireless services are at present controlled by Amalgamated Wireless (Australasia), Ltd. It is understood that there is no likelihood of these services being transferred ultimately to Cable and Wireless, Ltd. The whole subject is to be discussed by Mr. Lyons (the Federal Premier) and the British Postal authorities while Mr. Lyons is in England.

Great Britain.—WIRELESS LICENCES.—During February 686,056 licences were taken out, bringing the total in force at the end of the month to 6,954,288, which is 762,063 more than at the end of February, 1934.

Japan.—RADIO TELEPHONY.—A direct radio-telephone service between Japan and Great Britain was inaugurated on Tuesday. At the British end, operated by the G.P.O., the transmitter is at Rugby and the receiver at Baldock. The corresponding Japanese stations are Nazaki and Komuro, 50 and 25 miles respectively from Tokyo. The transmission and reception in Britain are both controlled from Faraday Building, London. The charge is £2 a minute (minimum £6).

London.—"CENTRAL" EXCHANGE GOES AUTOMATIC.—Last Saturday afternoon the 5,800 lines and 15,000 telephones of the London "Central" exchange were changed over to automatic operation. The transfer took only two minutes and was made under the supervision of Mr. E. Gomersall, the superintending engineer of the London district. An illustration appears on page 387.

Manchukuo.—TELEPHONE EXTENSIONS.—A scheme for extending the present telephone service is to be undertaken by the Manchuria Telegraph and Telephone Co. Among other improvements a new telephone exchange costing about £60,000 is to be built at Dairen. A thousand new telephones are to be installed in the Mukden district, and a new exchange to handle another 1,000 is to be built at Changchun.

Wakefield.—POLICE RADIO.—The West Riding Standing Joint Committee has decided to have a radio-transmitting apparatus installed at the police headquarters.

Telegraph and Telephone Services

Salient points from the 1934 reports on telegraph and telephone services in various districts (including London, Manchester and West Yorkshire) have appeared in recent issues of the ELECTRICAL REVIEW. *Further reports have since been published, and the details given below show that considerable headway has also been made in these areas, especially in popularising the telephone.*

LIVERPOOL.—The superintending engineer, Mr. T. E. Herbert, records that telegraph facilities were extended to ten offices. Sixty-two private teleprinter installations were in use at the end of the year, an increase of 25 per cent. This service is now available from Liverpool to twenty-nine other towns. Also sixty-two voice-frequency telegraph circuits were operating from Liverpool to London, Manchester, and Leeds. Each group of four wires can provide as many as eighteen channels for the simultaneous sending of messages.

New telephones numbered 8,823, while 6,534 were "recovered." The net increase of 2,289 represented 2.9 per cent. against 1.6 per cent. in 1933. Of the net increase 1,267 telephones were installed at the business rate and 1,022 were at the residence rate. There were 1,445 public call offices, including 740 street kiosks, the increase in the latter being 140. Two new small auto-exchanges were opened, and additional equipment was provided in two automatic and sixteen manual exchanges. A new main cable is being laid to link London, Liverpool, and Glasgow. It contains 364 pairs of wires, and the Liverpool to Glasgow section (230 miles) has been completed in record time. An additional 300-pair cable is being provided between Liverpool and Manchester.

Nearly 90 per cent. of the total trunk calls are now completed on demand (within two minutes). The number of calls of all kinds originated in the Liverpool area was 75 millions, an increase of 2.5 millions during the year.

BIRMINGHAM.—In the report of Mr. H. Faulkner, superintending engineer, it is revealed that telegraph facilities were extended to twenty-seven additional offices during 1934. "Telex" telegrams numbered 95,864, an increase of 33 per cent. The 91,730 telephones in use at the end of the year represented an increase of 5,392, or nearly twice the growth secured during 1933.

Private branch exchange installations grew by 226 to a total of 4,390 with 34,963 telephones connected. The number of calls increased by 11,385,000 to a total of 78,085,000, including 5,460,000 trunk calls. Three new automatic exchanges were opened and seven were extended, while fourteen manual exchanges were enlarged. "Telex" subscribers number eleven and teleprinter private wire rentees thirty-two. The underground wire mileage increased by 15,468 to 461,484 miles and the overhead mileage decreased by 490 to 20,416 miles.

NORTH WALES.—Telegraph traffic remained at about the same volume as in 1933, according to the report of Mr. H. Faulkner, superintending engineer. There were 387 telephone exchanges in the district at the end of the year, an increase of six, of which 117 were automatic. There were 101 rural automatic exchanges. Line plant capacity was materially increased at five exchanges in the Hanley area, at five in the Shrewsbury and Chester areas, and at three in the Bangor area. New switchboards were installed in eight exchanges.

Call offices increased in number by forty-nine to 1,716, including 550 kiosks; eighty-four kiosks were added in 1934 and thirty-nine more were in course of erection at the end of the year. Residential telephones increased by 1,439, or 12 per cent. The total of 11,930 represents 22 per cent. of all the telephones in the district, which increased by 3,264 to 53,025.

The number of local calls was 24 millions (1,106,399 more than in 1933), and trunk calls advanced by 224,314 to a total of 4,860,000.

NEWCASTLE-UPON-TYNE.—There was a net increase in telephone stations of 2,297 (5.4 per cent.). New equipment was installed at six manual exchanges and two new ones were opened as well as four new automatic exchanges. A number of other manual exchanges were converted to automatic working. Mr. F. G. C. Baldwin, the superintending engineer, states in his report that the total number of calls originating in the district was 34,408,000, an increase of 1,060,000 over the preceding year. A large number of new cables have been laid and services extended.

SHEFFIELD.—During 1934 the re-equipment of the telegraph instrument room at Sheffield was completed and the teleprinter has superseded all other types of instrument. Mr. A. Wright, the North Midlands superintending engineer, reports that 895,961 telegrams were dealt with, the decline during recent years having been arrested.

The telephone district, covering an area of approximately 756 sq. miles, is served by sixty-three exhanges, seventy-four per cent. of the subscribers being on the automatic system. The number of local calls increased by 2,151,980 to 23,522,185, but trunk calls declined by 320,000 to 1,670,323, due partly to the fact that 3d. and 4d. calls are now classed as local calls. There was an increase of 45 per cent. in the use of the international telephone services.

A new switchboard is being provided. The effect of the reduced charges has been very noticeable and the staff has been considerably increased

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—MELBOURNE.—Posts and Telegraphs Department. April 30th. Private automatic branch exchange telephone equipment. (A.Y.12940.)*

BRISBANE.—City Electric Light Co. May 14th. Oil immersed self-cooled outdoor type transformer. (A.Y.12948.)*

SYDNEY.—April 1st. Water Conservation and Irrigation Commission. 2,500-kW steam-driven turbo-generator. (A.Y. 12962.)*

Birmingham.—April 4th. Mental Hospital Department. Electric lighting and power re-wiring at Hollymoor Mental Hospital, Northfield. Specifications, &c., from the clerk to the Committee of Visitors, Council House by March 16th (deposit £5 5s.); tenders to the town clerk's office.

Blackpool.—March 19th. Electricity Department. Meters for the year ending March 31st, 1936. (March 8th.)

Bridlington.—March 25th. Corporation. 50-kVA transformer. (See this issue.)

Bury.—March 18th. Electricity Committee. P.i. l.c. cables for twelve months commencing April 1st. (March 8th.)

Coulsdon & Purley.—March 18th. U.D.C. Vehicle-actuated traffic signals for the Brighton Road-Chipstead Valley Road junction. Particulars from U.D.C. engineer (deposit £1 1s.)

Dartford.—March 23rd. Corporation. Switchgear extensions and glass-bulb rectifier extensions. (March 8th.)

Doncaster.—March 20th. Doncaster and Mexborough Joint Hospital Board. Re-wiring of the administrative and laundry blocks, Conisborough hospital. Specifications from the consulting engineer, Electricity Works, Station Road, Mexborough.

Dundee.—April 4th. Electricity Department. General engineering stores for one year. Specifications, &c., from D. H. Bishop, general manager and engineer, Dudhope Crescent Road; tenders to town clerk.

Durham.—April 1st. County Mental Hospital Visiting Committee. Deep well, borehole turbine pump with electric motor, and sinking borehole. (See this issue.)

Egypt.—CAIRO.—April 20th. Ministry of the Interior. Electrical equipment for the extension of the distribution system at Minia. (A.Y. 12938.)*

Ministry of Public Works. April 13th. L.p. cable. (A.Y. 12953.)*

Exminster.—March 22nd. Devon Mental Hospital Committee. Six months' supply of electrical goods, etc. Particulars from the clerk.

Gravesend.—March 23rd. Borough Council. 400-kVA transformer. (March 8th.)

Great Western Railway.—April 4th. General stores. (March 8th.)

Heckmondwike.—April 5th. Electricity Department. Plant and cables, meters, &c., in connection with the proposed change-over. (See this issue.)

Huddersfield.—March 25th. Corporation. Mercury-arc rectifier. (See this issue.)

Irish Free State.—DUBLIN.—March 25th. Electrical installation at the new County Hospital, Cashel. Specifications, &c., from V. Kelly, architect, 87, Merrion Square (deposit £15 15s.); tenders to the secretary, Clonmel.

Kidderminster.—March 25th. Worcestershire Education Committee. Electric lighting installation at the School of Science and Art. Particulars from the School Committee.

Kilmarnock.—March 21st. Town Council. Electric lamps for the year commencing May 16th. Particulars from the burgh surveyor, Market Bridge.

Kinross.—Town Council. Street lighting by electricity. Specifications, &c., from G. Wilson, town clerk (deposit £1 1s.).

Littleborough.—March 29th. Electricity Department. Meters for the year ending March 31st, 1936. (See this issue.)

London.—ST. PANCRAS.—April 4th. Electricity Department. One 100 b.h.p. oil-driven engine and d.c. generator. (See this issue.)

Manchester.—March 29th. Electricity Committee. Pipework, valves and traps, and de-superheater plant for Stuart Street power station. (See this issue.)

March 19th. Electricity Committee. 6,600-V and 33,000-V cables. (March 8th.)

Neath.—March 20th. Electrical Engineer's Department. Overhead lines, material and electric lamps for the year ending March 31st, 1936. Specifications from G. H. Thompson, Council Offices, Orchard Street; tenders to the clerk to the Council.

Newport (Mon.).—March 25th. Electricity Department. 250-kW 3-phase rectifier equipment. (March 8th.)

New Zealand.—WELLINGTON.—Public Works Department. June 4th. 110-kV outdoor switchgear, steelwork, &c. (A.V. 12926.)*

June 18th. 110-kV and 50-kV insulating push-rods. (A.Y. 12927.)*

April 8th. 200 66-kV, 3-part pin insulators. (A.Y. 12959.)*

AUCKLAND.—May 28th. Harbour Board. Four electric semi-portal jib cranes and spares. Specification from C. R. Butters, 4/5, Wood Street, E.C.2 (deposit £2 2s.)

Northern Ireland.—BELFAST.—March 19th. Town Council. Eighteen tramcar resistances. Particulars from the general manager, Tramways Department, Sandy Row.

Plymouth.—March 23rd. Electricity Department. Wireless rectifiers for the period ending March 31st, 1936. (See this issue.)

Portsmouth.—March 19th. Electricity Department. H.p. and l.p. switchgear and sub-station kiosks for the year ending March 31st, 1936. (March 8th.)

Rhondda.—March 18th. Electricity Department. Two 1,500-kW turbo-alternators and switchgear. (March 8th.)

Salford.—March 25th. Corporation. Mercury-arc rectifiers, transformers, switchboard and switchgear. (March 8th.)

Sheffield.—March 18th. Electricity Department. 450-kVA and 250-kVA three-phase transformers and 500-kVA Scott-connected sets. (March 8th.)

Stoke-on-Trent.—April 3rd. N.W. Midlands J.E.A. Meters. (See this issue.)

Uruguay.—MONTEVIDEO.—State Electricity Supply & Telephone Administration. April 22nd. Auxiliary telephone apparatus. (A.Y. 12951.)*

April 24th. Lead-covered telephone cable. (A.Y. 12952.)*

Wakefield.—March 25th. West Riding County Council. L.p. hot water apparatus and electric lighting at Otley Newall Infants' new school and heating and electric lighting at Hems worth Senior Mining Centre. Specifications, &c., from the education officer, County Hall; tenders to the clerk of the County Council.

Westhoughton.—March 18th. U.D.C. Electric lamps for one year ending March 31st, 1936. Particulars from G. Hayes. surveyor; tenders to clerk of the Council.

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Australia.—NEW SOUTH WALES.—Government Railways. Automatic telephone exchange inlet for Newcastle (£1,410).—Automatic Telephones, Ltd. Electric lift for White Bay power station (£1,050).—Arnold & Co. Pty., Ltd.

Public Works Department. Electrically driven pumping plants for Cowra sewerage (£1,311).—J. T. Jay. Private automatic exchange telephone system for Maitland district hospital (£248).—Siemens (Aust.) Pty., Ltd. X-ray equipment at Armidale and New England and Narrandera district hospitals (£716).—Stanford X-ray & Radium Co., Ltd.

VICTORIA.—State Electricity Commission. Electrically driven portable belt loader (£209).—B. Anquetil.

State Rivers & Water Supply Commission. Electrical equipment for Yarrawonga.—Associated General Electric Industries, Ltd.; Siemens (Aust.) Pty., Ltd.

Melbourne & Metropolitan Tramways Board. L.p. feeder cable (£1,459).—A. H. Gibson Pty., Ltd.

Birmingham.—Electricity Committee. Accepted. Meters.—British Insulated Cables, Ltd.; British Sangamo Co., Ltd.; Ferranti, Ltd.

Blackpool.—Electricity Committee. Accepted. Erection of overhead lines from Singleton to Weeton.—Pirelli-General Cable Works, Ltd.

Cardiff.—Electricity Committee. Accepted. Electric vehicles.—W. Lewis & Sons, Ltd. (£218); A. E. Morrison and Sons, Ltd. (£261).

Eccles.—Electricity Committee. Accepted. 500-kVA transformer (£244).—Electric Construction Co., Ltd.

Glasgow.—Housing Committee. Accepted. Electrical installations at three housing schemes (£1,246).—J. Stuart Denholm.

Transport Committee. Accepted. Steel diaphragms for 12,000-kW turbine at Pinkston power station.—British Thomson-Houston Co., Ltd.

Electricity Committee. Accepted. Transformers.—Brush Electrical Engineering Co., Ltd. (£277 each); British Electric Transformer Co., Ltd. (£297 each).

Hastings.—Electricity Committee. Recommended. Electrical supplies for twelve months.—British Insulated Cables, Ltd. (£480); W. T. Henley's Telegraph Works Co., Ltd. (£93); W. T. Glover & Co., Ltd. (£5,586); Siemens Electric Lamps & Supplies, Ltd. (£325); Metropolitan-Vickers Electrical Co., Ltd. (£7,245); Wooton & Co., Ltd. (£160); H. J. Baldwin & Co., Ltd. (250); H. B. Concrete, Ltd. (£250). Switch and transformer kiosk (£215).—Metropolitan-Vickers Electrical Co., Ltd.

Public Assistance Committee. Recommended. Electrical work at casual wards (£252).—R. Westbrook & Co.

Hull.—Water Committee. Accepted. Electric pumping unit (£78).—Sulzer Bros. (London), Ltd.

Telephones Committee. Accepted. Switchboards (£134).—Ericsson Telephones, Ltd.

India.—Indian Stores Department. Accepted. Cable and joint boxes.—W. T. Henley's Telegraph Works Co., Ltd. Electric battery truck and battery.—Heatley & Gresham Ltd. Armature coils.—English Electric Co., Ltd. Floodlight beacon lamps and cable.—General Electric Co. (India), Ltd. Boiler tubes.—Babcock & Wilcox, Ltd.

Irish Free State.—NENAGH.—Tipperary (N.R.) Board of Health. Accepted. Lighting and electrical fittings at the new general hospital (£2,223).—A. G. Bruty (Dublin).

Leeds.—Health Committee. Accepted. Electric lighting and power installation at Killingbeck sanatorium (£689).—Allenby & Stokell.

Liverpool.—Electric Power and Lighting Committee. Recommended. Alterations to existing switchgear at the Pumpfields sub-station (£1,398).—Ferguson, Pailin, Ltd. Two step-up transformers and switchgear for Lister Drive power station (£5,274).—Metropolitan-Vickers Electrical Co., Ltd.

Clarence Dock Power Station (Special) Committee. Recommended. Reactors and connecting switchgear (£17,151), explosion pots on existing auxiliary gear (£1,082), and additions to existing oil circuit-breaker (£578) at the Clarence Dock power station.—British Thomson-Houston Co., Ltd.

Hospitals Committee. Accepted. Various electrical supplies.—General Electric Co., Ltd.; Downes & Davies; Falk, Stadelmann & Co., Ltd.; W. T. Henley's Telegraph Works Co.,

Ltd.; Lind & Co., Ltd.; G. P. Dennis, Ltd.; Siemens Electric Lamps and Supplies, Ltd.; Simplex Electric Co., Ltd.; Howitt & Co.; Liverpool Electric Cable Co., Ltd.; British Insulated Cables, Ltd.; Mersey Cable Works, Ltd.

London.—East Ham.—Electricity Committee. Recommended. Floodlighting of the Municipal buildings for the Jubilee celebrations (£781).—Edison Swan Electric Co., Ltd.

Maidstone.—Town Council. Accepted. Switchgear for the West Farleigh supply.—British Thomson-Houston Co., Ltd. (£165); General Electric Co., Ltd. (£480).

Manchester.—Electricity Department. Accepted. Two boiler-feed pumps.—Mather & Platt, Ltd. H.p. steam pipes and receiver.—Stewarts & Lloyds, Ltd. 33,000-V main to Benchill sub-station.—Callender's Cable & Construction Co., Ltd.

Plymouth.—Electricity Committee. Accepted. Time switches.—Horstmann Gear Co., Ltd.; General Electric Co., Ltd. Meters.—Aron Meter Co.; Ferranti, Ltd. Cables.—British Insulated Cables, Ltd. Transformers and l.p. switchgear.—General Electric Co., Ltd. E.h.p. switchgear.—A. Reyrolle & Co., Ltd.; General Electric Co., Ltd.

Rotherham.—Transport Committee. Five sets of electrical equipment for new tramcars (£2,800).—General Electric Co., Ltd.

Seaford.—U.D.C. Accepted. Electric sewage pumps with motors, starting equipment, &c. (£530).—Wallwin Pumps, Ltd.

Tonbridge.—Electricity Committee. Recommended. H. and l.p. cables.—Standard Telephones & Cables, Ltd. Meters.—Measurement, Ltd.

Tunbridge Wells.—Town Council. Accepted. Switchgear for sub-stations.—British Thomson-Houston Co., Ltd. (£1,876); G. Ellison, Ltd. (£71).

Whitley and Monkseaton.—U.D.C. Accepted. Electric strip lighting and illuminations on the sea front (£600).—Coates & Co. (Harrogate).

Woolwich.—Town Council. Accepted. Switchboard (£15,897).—British Thomson-Houston Co.. Ltd.

Workington.—Electricity Committee. Recommended. Kiosk sub-station.—Crompton, Parkinson. Ltd. Circuit-breakers.—Standard Switchgear, Ltd. Underground link boxes.—W. T. Henley's Telegraph Works Co., Ltd. Overground feeder pillars.—W. Lucy & Co.

Forthcoming Events

Batti-Wallahs' Society.—Friday, March 15th. Hotel Metropole, W.C.2. Annual dinner and dance.

Electrical Contractors' Association (*Bradford Branch*).—Friday, March 15th. Great Northern Victoria Hotel, Bradford. Annual dinner.

Association of Mining Electrical Engineers.—Saturday, March 16th. 2.30 p.m. Joint visit with the Kent Sub-Branch to the Laboratory of the General Electric Co., North Wembley.

Electrical Power Engineers' Association (*Kent Section*).—Saturday, March 16th. Co-operative Hall, Gravesend. 6 for 6.30 p.m. Annual dinner.

Royal Institution.—Saturday, March 16th and 23rd. Institution, London. 3 p.m. "Electromagnetic Radiations." Lord Rutherford.

Institution of Electrical Engineers.—Monday, March 18th. Institution, London. 7 p.m. Informal meeting. Discussion on "Safety in Urban and Rural Consumers' Installations." To be opened by Mr. H. Leyburn. (*Meter and Instrument Section*).—Friday, March 15th. Institution, London. 7 p.m. Informal meeting. Papers on transformers and meters. (*North-Eastern Students' Section*).—Friday, March 15th. Armstrong College, Newcastle-upon-Tyne. 7.15 p.m. "High-Voltage Impulse Testing." Mr. F. M. Bruce. (*North Midland Students' Section*).—Saturday, March 16th. Visit to Jowett Cars, Ltd., Idle. (*South Midland Students' Section*).—Saturday, March 16th. 2.30 p.m. Visit to the Pooley Hall Colliery Co., Ltd., Polesworth. (*Tees-Side Sub-Centre*).—Monday, March 18th. Cleveland Technical Institute, Middlesbrough. 6.45 p.m. Particulars to be announced later. (*Western Centre*).—Monday, March 18th. The University, Bristol. 6 p.m. "Electrical Developments in the U.S.S.R." Mr. A. Monkhouse. (*East Midland Sub-Centre*).—Tuesday, March 19th. The College, Loughborough. 6.45 p.m. "Electrical Traction." Mr. C. A. Brearley. (*Mersey and North Wales (Liverpool) Students' Section*).—Tuesday, March 19th. The University, Liverpool. 7.30 p.m. "Some High Voltage Problems at High Frequencies." Mr. G. N. Coop. (*North Midland Centre*).—Tuesday, March 19th. Hotel Metropole, Leeds. 7 p.m. Annual general meeting. (*North-Western Centre*).—Tuesday, March 19th. Engineers' Club, Manchester. 7.15 p.m. Papers by Messrs. W. D. Horsley and O. Howarth. (*Sheffield Sub-Centre*).—Wednesday, March 20th. Royal Victoria Hotel, Sheffield. 7.30 p.m. Particulars to be announced later. (*Transmission Section*).—Wednesday, March 20th. Institution, London. 6 p.m. "Transmission Line Insulators under Deposit Conditions." Messrs. W. J. John and F. M. Sayers. (*Bristol Students' Section*).—Thursday, March 21st. "The Fuller Use of Telephone Lines in Transmission Systems." Mr. T. E. Jackson. (*Irish Centre (Dublin)*).—Thursday, March 21st. Physical Laboratory, Dublin. 6 p.m. Particulars to be announced later. (*London Students' Section*).—Friday, March 22nd. Institution, London. 7 p.m. "Power Plant for Automatic Telephone Exchanges." Mr. K. B. Baldwin. Saturday, March 23rd. 3 p.m. Visit to the Research Laboratories of the General Electric Co., Ltd., Wembley.

Association of Supervising Electrical Engineers.—Tuesday, March 19th. Brettenham House, W.C.2. 7.15 p.m. "Power Factor Correction." Mr. E. W. Dorey.

Edinburgh Electrical Society.—Wednesday, March 20th. Philosophical Institution, Edinburgh. Annual general meeting.

Birmingham Electric Club.—Friday, March 22nd. Grand Hotel, Birmingham. 7 p.m. "Specifications." Mr. F. M. Lea.

Notes

The Generation of Electricity

The official returns rendered to the Electricity Commissioners show that 1,478 million kWh was generated by authorised undertakers during February, as compared with the revised figure of 1,343 million kWh in the corresponding month of 1934, representing an increase of 135 million kWh, or 10 per cent. The number of working days in the month (*i.e.*, excluding Sundays) was twenty-four, the same as last year.

During the first two months of 1935 the total amount of electricity generated by authorised undertakers was 3,192 million kWh as compared with the revised figure of 2,879 million kWh for the corresponding period of 1934, representing an increase of 313 million kWh or 10.9 per cent.

	1934. kWh. (millions).	1935. kWh. (millions).	Increase per cent.
January	1,536	1,714	11.6
February	1,343	1,478	10.0

The Batti-Wallahs' Society

At the monthly luncheon of the Batti-Wallahs' Society at the Hotel Metropole on March 7th Mr. J. S. Highfield presided in the absence of the president. The principal guest was Prof. G. T. R. Hill, who spoke of his early experiences when learning to fly and in the design and construction of aeroplanes. In moving a vote of thanks, Mr. Roger T. Smith commented on the significance of Prof. Hill's appointment to a professorship in the University of London after spending the whole of his life in practical engineering rather than on the academic side. Another similar instance was the recent appointment of Mr. R. O. Kapp to the same University.

The next luncheon of the Batti-Wallahs' Society will be held on April 4th at the Hotel Metropole, when an address will be given by Lord Stonehaven.

The E.I.B.A. (South Coast Section)

The South Coast Branch Centre of the Electrical Industries Benevolent Association is holding a dance at the Grand Hotel, Brighton, on March 29th. Tickets can be obtained from Mr. B. S. H. Ward, hon. organising secretary, Messrs. Cryselco, Ltd., 59, Ship Street, Brighton.

Scholarships in Electrical Engineering

Applications for the undermentioned scholarships awarded by the Council of the Institution of Electrical Engineers to British subjects under the stated ages at July 1st, 1935, must be made by April 15th. Nomination forms are obtainable from the secretary, Savoy Place, W.C.2:—The Duddell (£150 p.a. for three years) for candidates under nineteen years of age who have matriculated (or passed an exempting examination) at a British university and who wish to take a whole-time day course in electrical engineering. Nomination by a corporate member of the I.E.E.; preference given to sons or near relatives of past or present members.

The Ferranti (£250 p.a. for two years) for students or graduates of the Institution of not less than two years' standing and under twenty-six years of age who wish to carry out whole-time research or post-graduate work in electrical engineering, including travelling. Candidates must have completed a three years' course in electrical engineering or science and be nominated by their professors or teachers. Preference given to sons of past or present members.

The Swan Memorial (£120 for one year) generally similar to the Ferranti but open to those under twenty-seven born or resident for seven years in Sunderland or educated at Sunderland Technical College and nominated by their professors or teachers.

The Silvanus Thompson (£100 p.a. with tuition fees to provide whole-time day-course university or technical college training for two years) for works employés under twenty-two years with limited means, who have served a minimum approved apprenticeship of three years and have taken full advantage of opportunities for technical education and shown evidence of skill and originality. Nominations by corporate members of the Institution.

Appointments Vacant

Engineer and manager for the Shipley U.D.C. (£500-£25-£650).

Factory overseer in the Stores Branch of the I.F.S. Department of Posts and Telegraphs.

Sub-station charge engineer for South Shields Electricity Department.

Showroom lady demonstrator for Worksop Electricity Department.

Technical assistant for Ordnance Factories, Royal Arsenal, Woolwich.

Temporary technical assistant for the Directorate of Works, War Office.

(See our classified advertisements.)

Makers' Names Wanted

F.W. wooden floor and table standards.
Edolite lamp.
Hodac all steel circuit-breakers.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

At the recent annual general meeting of the Leicestershire and Warwickshire Area Electrical Development Circle the following officers were appointed for the year:—

President: Mr. A. D. Phillips, A.M.I.E.E., general manager, Leicester & Warwickshire Electric Power Co. (re-elected). Chairman: Mr. T. H. Wathes, managing director of Messrs. T. H. Wathes & Co., Ltd. Hon. secretary and treasurer: Mr. R. B. Giles, Leicestershire & Warwickshire Electric Power Co. (re-elected). Committee: Messrs. A. V. Wilson (Electrical Equipment Co.), F. J. Smith (Midland Dynamo Co., Ltd.), A. Walker (Walker & Wileman), W. Stephens (Countesthorpe), and H. Morris (Macintosh Cable Co.).

Mr. S. R. Wright who has joined the Dubilier Condenser Co. (1925), Ltd., as chief technical and liaison representative.

Mr. G. L. Mason has been presented with an electric lamp and bridge table by the staff of the Lothians Electric Power Co. on leaving to take up a post with the Northern Ireland Electricity Supply Board. The presentation was made by Mr. H. C. Babb, manager of the company.

Mr. G. W. Bailey, of the staff of the Derby & Notts Electric Power Co., who was recently married at Ilkeston to Miss E. M. V. Paton, has been presented by his colleagues with a wireless set and electric clock.

Mr. N. Wilkinson, of South Shields, has been appointed works superintendent in the South Shields electricity undertaking in succession to Mr. Robertson, who has retired. There were 130 applicants for the position.

Mr. F. Lydall, M.I.E.E., has entered into partnership with Messrs. Merz & McLellan. Mr. Lydall is a well-known authority on railway electrification, and is the author of many papers on the subject. In 1933 he was awarded the Railway Engineering Medal by the Council of the Institute of Transport for a paper dealing with "British Main Line Electrification."

Mr. E. B. Holloway, ironmonger, of Windmill House, Cradley, Staffs, has been appointed hon. secretary of the recently formed electrical section of the Ironmongers' Federated Association, the national organisation of the retail hardware trade.

Mr. A. R. Gundry, M.I.E.E., M.I.Mech.E., chief electrical engineer, East Indian Railway, is shortly proceeding to England, on retirement, after twenty-eight years in India. Mr. Gundry received his technical education at the City and Guilds Finsbury College, London, and his practical training with Messrs. J. Stone & Co. and Messrs. Siemens Bros. In 1900 he joined the St. Pancras Borough Council electricity works, and in 1905 went to the Bermondsey electricity works. He was appointed by the Secretary of State for India to take charge of the electrification of the Calcutta Mint in 1907, and was transferred in 1910 to the Eastern Bengal Railway, where he was responsible for the complete electrification of two large locomotive and carriage workshops, including the design and installation of two large power houses. Mr. Gundry was consulting electrical engineer to the Indian Munitions Board from 1918 to 1919, and in 1928 he was appointed chief electrical engineer to the East Indian Railway, in which position he has been responsible for a number of important new works.

Mr. A. R. Gundry

The electrical plant installed on this railway includes a number of large power houses, and over 37,000,000 kWh is distributed annually for lighting and power at the various railway stations, workshops and collieries; the capital expenditure on electrical plant being nearly 1½ million pounds. Mr. Gundry has been a prominent member of the Electrical Section of the Indian Railway Conference Association since its inception, and was chairman in 1929-30; he has also been chairman of a number of committees convened to report on electrical matters concerning railways in India.

Mr. J. R. Struthers, the deputy electrical engineer and manager of the Belfast Corporation Electricity Department, was appointed electrical engineer and manager of the Sheffield electricity undertaking at a meeting of the Sheffield City Council held on March 6th. Mr. Struthers was educated at the Stirling High School, Alloa Technical School, and the Royal Technical College, Glasgow. He served an apprenticeship in the electrical department of a Stirling firm for two years and for four years with the British Electric Plant Co., Alloa. He joined Glasgow Corporation in 1907, and after having experience on sub-station and distribution work he was transferred to the power stations. When the construction of Dalmarnock Station began he was appointed technical clerk of works on site, and was associated with the work of putting the station into commission. When this work was completed he was appointed deputy resident engineer. In 1922 he became chief assistant engineer in the Belfast Corporation Electricity Department, and was appointed deputy city electrical engineer and manager in 1929. He is a member of the Institution of Electrical Engineers, and of the Institution of Engineers and Shipbuilders. He has taken an active interest in the commercial activities of Belfast.

[A. R. Hogg, Belfast.

Mr. J. R. Struthers

Mr. W. H. Taylor, general manager of the Electricity Supply Department of the Western Australian Government, will arrive in this country shortly in connection with the supply of new plant for the East Perth power house. As already reported, the State Government has accepted tenders to the value of £525,000. International Combustion, Ltd., is to supply complete boiler-house equipment; Messrs. C. A. Parsons & Co., Ltd., a turbo-alternator and condensing plant; and Metropolitan-Vickers Electrical Co., Ltd., h.p. and l.p. switchgear. Mr. Taylor will co-ordinate the tenders and supervise the shipping of the machinery.

Mr. J. W. Beauchamp, M.I.E.E., has been appointed commercial manager to the Central Electricity Board. For the past five years he has been the Board's district manager for the South-West England and South Wales area. **Mr. J. T. H. Legge,** M.I.E.E., has been appointed to succeed Mr. Beauchamp in that post. Both gentlemen are so well known in the electricity supply world that few words regarding their careers are needed. Mr. Beauchamp left West Ham electricity undertaking to form the Electrical Development Association, and those of us who remember the time and energy that he devoted to that organisation when funds were low and discouragement abounded know under what a debt of gratitude to him the movement and the industry stand. He

[Elliott & Fry.

Mr. J. W. Beauchamp, the new commercial manager of the Central Board, and Mr. J. T. H. Legge, who becomes district manager for the S.W. England and South Wales Area

left the Association at the end of 1927 to become general manager to the South Wales Power Co., and as stated he relinquished that post five years ago to take up the position in which he is succeeded by Mr. Legge.

It will be remembered that several months ago Mr. Legge resigned his position as managing director of Edmundson's Electricity Corporation, Ltd., and also the posts which he held in associated companies. For several years he was managing director of the Shropshire, Worcestershire and Staffordshire Electric Power Company which consolidated a number of municipal and company undertakings into a large distribution concern. The S.W. & S. Co. extended its operations three and a half years ago by taking over the control of the contiguous South Wales Electric Power Co. Mr. Legge has been prominently associated with the work of the Incorporated Association of Electric Power Companies, the National Joint Board, and the National Joint Industrial Council for the Electricity Supply Industry.

Mr. J. H. Farthing, of Manchester, director of the General Electric Co., Ltd., and Mrs. Farthing will leave on the Cunard-White Star liner *Scythia* on March 30th for a six weeks' visit to the United States. Mr. Farthing intends to visit a number of electrical factories in America, and will also make observations on the progress of television.

Mr. J. W. Needham, chairman and managing director of the Northern Steel & Hardware Co., Ltd., has been elected president of the Manchester and District Radio Trades Luncheon Club in succession to Mr. J. H. Farthing.

Mr. Samuel Insull has been acquitted of the charge of embezzling $66,000 from the funds of the Middle West Utility Co.

Mr. F. W. Muncaster, managing director of General Resistors, Ltd., who has been seriously ill for some weeks, is now reaching the convalescent stage and hopes to be able to renew his business activities in about a fortnight's time.

Obituary

Mr. W. Emmott.—The death recently occurred, at the age of eighty-one years, of Mr. Walter Emmott, of Halifax, who, with his partner, the late Mr. Edmund Blakey, opened in July, 1880, the first telephone exchange in Leeds. Later the Blakey & Emmott exchange was taken over by the United Telephone Co. Messrs. Blakey & Emmott also constructed the first successful trunk line between Bradford and Leeds, and they commenced the electricity undertaking which is now the property of the Halifax Corporation. He became an associate of the Institution of Electrical Engineers in 1878 and a member in 1886.

Dr. E. Bowden.—The funeral of the late Dr. Edward Bowden took place at Grangetown Cemetery on March 7th, and a service was held at All Saints' Parish Church, S.W.11, on the previous day, conducted by the Vicar, the Rev. Noel Kynaston-Gaskell.

The mourners included Mrs. E. Bowden (widow), Mr. and Mrs. E. Strachan (brother-in-law and sister), Miss Jordan (sister-in-law), Mrs. Jordan, Mr. R. D. Bowden, Mr. C. F. Derry, Mr. W. Dixon, Mr. Stevens. Lord Forrester (representing the Earl of Verulam, chairman of the Enfield Cable Works, Ltd.), Mr. F. Plutte, Jnr. (representing Mr. F. Plutte, managing director), and Mr. F. J. Bassett (representing Mr. M. Hochstadter) were present with the following directors and executive staff:—Messrs. A. E. Tanner (director), W. L. Smith (secretary), A. B. Collins, P. F. Deakin, F. W. Main, D. A. S. Porteous, and E. C. Pentney. Others present included Lt.-Col. and Mrs. Sutcliffe, Messrs. Reynell, H. C. Wells, Hendrick and B. D. P. Jones (County of London Electric Supply Co., Ltd.), Messrs. Ward, Whetman, Wallis, and Sharpe (Messrs. Merz & McLellan), Messrs. P. V. Hunter, C. Pipkin, J. Urmston, H. J. Allcock, and W. Hill (Callender's), Dr. P. Dunsheath (Henley's), Mr. C. J. Beaver (W. T. Glover & Co.), Mr. Cave (Macintosh Cable Co.), Mr. H. C. Rose (H. C. Rowland & Co.), Messrs. A. H. Selwyn, W. W. Clarke, and Morgan (Cable Research), Mr. H. Willoughby (Pirelli-General), Mr. F. Klare (Enfield Rolling Mills), and Mr. B. C. Gordon Ritter (Public Works Conciliation Board).

Mr. J. Gray.—We regret to record the death on March 12th of Mr. John Gray, B.Sc., M.I.E.E., a director of the British Thomson-Houston Co., Ltd., and a well-known figure in the electrical industry. Mr. Gray was born in 1874, and was educated at George Watson's College, Edinburgh, and Glasgow University, where he took the B.Sc. degree in engineering. After serving as private secretary to Lord Kelvin, he joined the staff of Marks & Clerk, the consulting engineers and patent agents, and was manager of their Manchester office. He joined the British Thomson-Houston Co., Ltd., in 1902, and was in charge of the company's Patent Department, joining the board of directors in October, 1927. When the original British Broadcasting Co. was formed in 1922, with the B.T.H. Co. as one of the constituent firms, Mr. Gray became a director. He was also a director of the Calorising Corporation of Great Britain, Ltd., and chairman of the Hotpoint Electric Appliance Co., Ltd. For some time he was a member of the Council of the Chartered Institute of Patent Agents.

[Elliott & Fry.
The late Mr. John Gray

Mrs. W. Y. Anderson.—We regret to record the death, which occurred on March 5th, after a long illness, of Mrs. Anderson, wife of Mr. W. Y. Anderson, so well known as commercial engineer of the Birmingham Electricity Supply Department. The editors of the ELECTRICAL REVIEW, in expressing deep sympathy with Mr. Anderson and his two daughters, know that they are also voicing the sentiments of a large number of electrical men in Birmingham and other parts of the country.

Sir A. L. Dickinson.—The death occurred suddenly on February 28th of Sir Arthur Lowes Dickinson, M.A., F.C.A. Sir Arthur, who was a partner in Price, Waterhouse & Co., chartered accountants, London, and included amongst his other interests directorships of the Dubilier Condenser Co. (1925), Ltd., and the Farnham Gas & Electricity Co., Ltd., was seventy-five years of age.

Prof. W. Duane.—A message from Philadelphia announces the death, at the age of sixty-three, of Professor William Duane, a descendant of Benjamin Franklin, who was known for his researches in radio-activity and X-rays and their application to the treatment of diseases, also in thermo-electric forces, the velocity of electric waves, the structure of matter, the mechanism of radiation, and other related subjects.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Allied Electrical & Furniture Industries, Ltd.—Public company. Registered March 4th. Nominal capital £125,000 in 120,000 ordinary shares of £1 and 100,000 deferred shares of 1s. each. Objects: To acquire as going concerns the businesses now carried on by Regent Investment & Sales, Ltd., and Conways Electric, Ltd., together with all or any of the real and personal property and assets of the proprietors, and to carry on the business of manufacturers, importers, exporters and repairers of and dealers in furniture, electrical and other refrigerators and refrigeration plant, cabinets, chests, glass mirrors, overmantels, gas and electric fittings, wireless television, transmitting and receiving sets and electrical components, &c. The first directors are E. J. Taylor, 111, Lanark Villas, Maida Vale, W.9, and two others. Registered office: 176, Park Avenue, North Circular Road, N.W.10.

Sunderland Engineering Equipment Co., Ltd.—Private company. Registered March 6th. Capital, £5,000 in £1 shares. Objects: To carry on business as mechanical, marine, hydraulic and electrical engineers and manufacturers, tool makers, woodworkers, electricians, makers of metal tubes, cycle, motor and aircraft engineers, manufacturers and repairers of cycle, motor and aircraft accessories, domestic, electrical and other fittings and accessories, &c. The permanent directors are: N. Cooke, 67, Otto Terrace, Sunderland, and three others. Secretary: Fredk. Bailes. Registered office: 19, Thomas Street, Sunderland.

Multiplex Trading Co. (London), Ltd.—Private company. Registered March 8th. Capital, £10,000 in 40,000 1s. ordinary shares and 32,000 6 per cent. non-cumulative 5s. preference shares. Objects: To carry on the business of manufacturers of and/or dealers in lighting equipment, electrical, radio and automobile goods, &c. The directors and other particulars are similar to Multiplex Patents (London), Ltd.

Multiplex Patents (London), Ltd.—Private company. Registered March 8th. Capital, £10,000 in 32,000 6 per cent. non-cumulative 5s. preference shares and 40,000 1s. ordinary shares. Objects: To acquire the patent rights of Simon Hermont. The directors are: S. Reitzman, 26, Gloucester Place, W.1, and three others. Solicitors: Woodhouse & Co., Aldwych House, Aldwych, W.C.2.

Elliot & Lane, Ltd.—Private company. Registered March 6th. Capital, £1,000 in 300 "A" shares of £1 each and 280 "B" shares of £2 10s. each. Objects: To carry on the business of manufacturers of and dealers in wireless receiving or transmitting sets, gramophones, and all electrical or other appliances required for telegraphy, broadcasting and television, &c. The directors are: F. J. H. Elliot, 19, Byron Road, Harrow, and C. H. Lane, 107, Hindes Road, Harrow. Registered office: 107, Hindes Road, Harrow.

Radio Transmission Equipment, Ltd.—Private company. Registered February 28th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in radio apparatus, &c. The subscribers are: J. A. H. Smith, 165, Aldborough Road, Seven Kings, Essex, accountant, and

another. Solicitors: Godfrey Warr & Co., 19, Fenchurch Street, E.C.3.

Barlow's Weston-Electric Lighting Co., Ltd.—Private company. Registered March 5th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers, importers and exporters of and dealers in all kinds of wireless apparatus, cabinets, loud speakers, receiving and transmission sets, &c. The first directors are: J. Barlow, 4, Grecian Street, Bolton, and three others. Registered office: 4, Grecian Street, Bolton, Lancs.

Kerr Radio, Ltd.—Private company. Registered in Belfast, February 28th. Capital, £2,500 in £1 shares. Objects: To acquire the business of radio apparatus dealers now carried on as "Kerr Radio," at 69, Peter's Hill, and 30, Sandy Row, Belfast. The subscribers are: R. S. Dorman, 16, Carlisle Street, Belfast, and J. D. Leslie, 238, Cliftonville Road, Belfast. R. S. Dorman is the first director.

Neon (Lancashire), Ltd.—Private company. Registered March 1st. Capital, £500 in 10s. shares. Objects: To carry on the business of manufacturers, hirers and repairers of and dealers in electric signs, lamps, advertising signs, neon electric signs, &c. The directors are: P. S. Ritherdon, Yew Tree Farm, Hall-i'-th'-Wood, Bolton, and two others.

Abraham & England, Ltd.—Private company. Registered February 27th. Capital, £500 in £1 shares. Objects: To acquire the business of a wireless dealer carried on by C. P. Abraham, at 32, Castle Street, Hastings. The first directors are: C. P. Abraham, 32, Castle Street, Hastings, and J. N. England, 135, London Road, St. Leonards-on-Sea. Registered office: 32, Castle Street, Hastings.

W. E. Pearson (Plymouth), Ltd.—Private company. Registered March 1st. Capital, £300 in £1 shares. Objects: To carry on the business of electrical engineers, electrical contractors and salesmen, mechanical engineers, radio contractors, &c. The directors are: A. W. Bathews, 4, Ronald Terrace, Ford, Plymouth, and W. E. Pearson, 51, Mount Gold Road, Plymouth. Registered office: 51, Mount Gold Road, Plymouth.

Returns of Electrical Companies

Flexible Electric Cords, Ltd.—The nominal capital has been increased by the addition of £73,850 in £1 ordinary shares beyond the registered capital of £1,150. The 150 8 per cent. cumulative preference shares of £1 in the registered capital were converted into 150 ordinary shares of £1 on February 28th. Satisfaction in full on February 26th, 1935, of first debenture dated May 13th, 1929, and second debenture dated May 30th, 1929, and registered May 14th, 1929, and June 12th, 1929, securing £500 and £200 respectively.

Britannia Electric Lamp Works (1934), Ltd.—Satisfaction in full on February 21st, 1935, of debenture dated October 22nd, 1934, and registered October 23rd, 1934. (According to the register of mortgages, the debenture registered October 23rd, 1934, originally secured all moneys due to bank.) Debenture, dated February 16th, 1935, to secure £20,000, charged on the company's undertaking and property, present and future, including uncalled capital. Holders: Branch Nominees, Ltd.

Egham & Staines Electricity Co., Ltd.—The nominal capital has been increased by the addition of £150,000 in £1 ordinary shares beyond the registered capital of £500,000.

Mid-Lincolnshire Electric Supply Co., Ltd.—The nominal capital has been increased by the addition of £100,000 beyond the registered capital of £200,000. The additional capital is divided into 100,000 ordinary shares of £1. The new shares were allotted for cash on February 20th, 1935, to the British & International Utilities Co., Ltd.

Uxbridge & District Electric Supply Co., Ltd.—The nominal capital has been increased by the addition of £400,000 in £1 ordinary shares beyond the registered capital of £600,000.

Slough & Datchet Electric Supply Co., Ltd.—The nominal capital has been increased by the addition of £50,000 in £1 ordinary shares, beyond the registered capital of £250,000. 15,000 shares were allotted for cash to the Metropolitan Electric Supply Co., Ltd., on February 12th, 1935.

Irradiant Lamp Works, Ltd.—H. Wretts-Smith, of 69 and 70, Broad Street Avenue, E.C., ceased to act as receiver and/or manager on March 4th, 1935.

Salora Lights, Ltd. (formerly Aurora Lights, Ltd.).—E. T. Peirson, C.A., of 17, Hertford Street, Coventry, was appointed receiver and manager on March 4th, 1935, under powers contained in debenture dated January 29th, 1935.

Durham County Relay Service, Ltd.—Second debenture, dated February 28th, 1935, to secure £400, charged on the company's property, present and future, including uncalled capital (subject to debenture dated November 14th, 1934). Holder: D. Ferrier, 4, Dunstable Road, Luton.

Electric Totalisators, Ltd.—Capital, £50,000 in £1 shares. Return dated January 11th, 1935. 47,600 shares taken up. £47,600 paid. Mortgages and charges nil.

Hedingham Radio, Ltd.—Capital, £1,000 in £1 shares. Return dated December 27th, 1934. 577 shares taken up. £577 paid. Mortgages and charges: £1,550.

Allen West & Co., Ltd.—Capital, £700,000 in 300,000 preference and 400,000 ordinary shares of £1. Return dated January 14th, 1935. All shares taken up. £541,741 paid on 300,000 preference and 241,741 ordinary shares, £158,259 considered as paid on 158,259 ordinary shares. Mortgages and charges: £210,000.

Lincoln & Egerton, Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated February 21st, 1935, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Trowbridge Radio Relay Service, Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated February 11th, 1935, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Electrical Machinery & Equipment Co., Ltd.—Debenture, dated February 15th, 1935, to secure £550, charged on the company's undertaking and property, present and future, including uncalled capital. Holders: Electric Lamp Service Co., Ltd., Stal House, Judd Street, W.C.

Weston Electric Lamp Co. (1933), Ltd.—Debenture, dated February 15th, 1935, to secure £550, charged on the company's undertaking and property, present and future, including uncalled capital. Holders: Electric Lamp Service Company, Ltd., Stal House, Judd Street, W.C.1.

Brentford Electric Supply Co., Ltd.—The nominal capital has been increased by the addition of £25,000 in £1 ordinary shares beyond the registered capital of £75,000.

Thomas R. Hills, Ltd.—The nominal capital has been increased by the addition of £1,000 beyond the registered capital of £1,000. The additional capital is divided into 900 ordinary shares of £1 and 400 deferred shares of 5s.

Plew Television, Ltd.—H. L. Ward, of 52, Bedford Square, W.C.1, ceased to act as receiver and manager on March 1st, 1935.

Electric Supplies (Bloxwich), Ltd.—Capital, £5,000 in £1 shares. Return dated January 4th, 1935. 2,300 shares taken up. £1,558 paid, £742 considered as paid. Mortgages and charges nil.

Block Batteries, Ltd.—Issue on February 21st, 1935, of £1,000 debentures, part of a series already registered.

City Notes

The English Electric Co., Ltd., held its annual meeting on March 12th, Mr. G. H. Nelson (chairman and managing director) presiding. In presenting the report and accounts (ELECTRICAL REVIEW, March 8th, page 365) the chairman referred to the death of Mr. J. H. Gannon, who resigned his directorship during the year, and the appointment of Mr. H. T. Rice to the board. Turning to the business of the past year, he said that the improvement which began early in 1934 in the volume of orders received was maintained throughout the year and continued up to date. This increased business was not due solely to the general improvement of the country's trade, but was the result also of the policy adopted by the board of embarking, during the depression, on the development of new lines of apparatus. Although better, prices were still considerably below those necessary to maintain the heavy electrical industry in a really efficient condition able to provide its own development as against world improvements. The year had, however, been marked by an improvement in the co-operative relationship of most of the firms in the industry, and they were hopeful that it might be possible to make further progress on this line of approach to their common problems, and in this way to attain more stable conditions in the industry, without which the power to give the best service to consumers must be imperilled. Export business was still attended with great difficulties, and although there was some improvement, their export trade was still only about one-third of the percentage of the turnover which it represented in normal years. In every section of their business the orders received in 1934 had been in excess of the average for the previous three years. In recent years they had endeavoured to increase the proportion of their day-to-day business, as compared with the heavy side, and they were now beginning to feel the benefits of that policy. Regarding their heavy plant business, at their Willans factory, Rugby, they had been better employed than in previous years, and the outlook for the current year was even better than last year. They had received their full share of the steam turbine orders that had been placed, at reasonable prices. In their Diesel Engine Department they had made great progress and obtained many important contracts, both at home and abroad, including valuable orders for the British Admiralty and the War Office. In the marine field they had received orders through Messrs. A. & J. Inglis, Ltd., from the L. & N.E. Railway for a Diesel-electric paddle passenger vessel for service between the Clyde ports, and in conjunction with Messrs. Thornycrofts from the Thames Tug & Lighterage Co. for a Diesel-electric tug for operation on the Thames. They built a Diesel-electric coach and a Diesel-electric shunting locomotive for test on the L.M. & S. Railway, and as a result an order for ten 50-ton Diesel-electric shunting locomotives was placed with them recently by that company, the mechanical parts being manufactured by Hawthorn, Leslie & Co., Ltd. They had again received valuable orders from the Southern Railway Co. for their extensions, and the Danish State Railways had ordered additional equipments for their electrified lines around Copenhagen. The progress made on their contract with the Polish Government was satisfactory. Their traction shops at Bradford continued to be fully occupied with the manufacture of motors and equipments for the Southern Railway, Danish and Polish State Railways, and for various trolley bus and tramcar orders, amongst which were the equipments for fifty-two trolley buses ordered recently by the London Passenger Transport Board. Their body shops at Preston had been well filled during the year, and they had received orders for luxury tramcars from Blackpool Corporation built to the design of Mr. Luff, the Corporation's general manager. In South Africa they were continuing to obtain orders for electric winders for the gold mines and for plant required for steel works and power houses. but prices in this market were unremunerative, largely owing to the lack of co-operation between British manufacturers. Efforts had been made to improve this position and were continuing, but little success had so far resulted. Of the eleven hydro-electric sets that they were supplying to the Galloway Water Power Co., five were already installed and two of them were last week connected to the grid for regular service. They had received many important orders for rolling-mill drives from steel companies in this country, but here again, in this particular class of apparatus, in this country as well as abroad, prices had not been remunerative. The position of the company at the beginning of the current year was not less favourable than at the beginning of 1934, and given improvement in the level of prices and an order book maintained at the rate experienced during the last few months, they looked forward to

presenting, at a not very distant date, accounts which should be more satisfactory to the shareholders. They had decided to repay the outstanding debentures of their subsidiary company, Willans and Robinson.

The North Metropolitan Electric Power Supply Co.—Presiding at the annual meeting held on March 12th, Lord Ashfield (chairman), who presided, said there had been no diminution during the year under review in the rate of progress which they had experienced for several years, and the volume of business transacted showed considerable expansion as compared with that of the previous year. The sales of electricity amounted to 423,500,000 kWh, an increase of 20 per cent., and the number of consumers supplied directly or indirectly totalled 254,735, an increase of nearly 17 per cent. This expansion was largely due to the number of new houses, shops, factories, and other buildings that had been erected in the Northmet area, and in the increased use of electricity generally. The liberal and progressive policy which they had followed for some years had also contributed to this increased demand for electricity. During 1934 they had spent £781,000 on capital works and reduced all standard rates of charge for electricity to domestic and power consumers, and also to certain other classes not coming under the standard rates. The cost of these reductions would amount to more than £113,000 in a full year. During the past five years the average consumption per annum by their domestic consumers had risen from 487 kWh per consumer in 1930 to 527 kWh in 1934, and during the same period the average rate charged had steadily been reduced from 2.67d. to 2.08d. per kWh. For consumers on the "all-in" rate the average rate was only 1.42d. per kWh. The Brimsdown "A" station had been transferred during the year to the North Metropolitan Power Station Co., Ltd. The number of new sub-stations put into service was seventy-seven, and approximately 218 miles of underground mains were laid and twenty-four miles of overhead lines erected. The subsidiary companies had made satisfactory progress. During the year 1,635 additional public lamps had been installed, bringing the total to 9,875 lamps. New contracts included the lighting by electric discharge lamps of nine miles of main roads in Enfield, Southgate, and Wood Green. Referring to the grid scheme, Lord Ashfield said that it might well be that they would be asked in the near future to extend their power stations, and they must, therefore, contemplate the expenditure of a large sum of money for this purpose. At the end of last year they had a loan from the bank of £145,000, and they would find it necessary to increase this loan during the current year. They must ultimately make provision for their capital requirements upon a permanent basis, though what form this should take and when it should be done could not be indicated at present. The directors were giving careful thought to the matter, and the stockholders would be advised of their decision in due course.

The County of London Electric Supply Co., Ltd., reports a profit for 1934 of £1,869,096, as compared with £1,721,489 in the preceding year, to which is added £347,042 brought in, making £2,216,138. After deducting debenture interest, &c., and transferring £625,304 to reserve for depreciation (including contributions to sinking funds), £20,000 to taxation reserve, and £50,000 to general reserve (including No. 2 reserve), there is a balance of £1,221,533. It is proposed to pay a final dividend on the ordinary shares of 7½ per cent., making 10½ per cent. for the year (unchanged), and to carry forward £395,188. Following the annual meeting to be held on March 19th, resolutions will be submitted for increasing the capital from £12,000,000 to £14,000,000 by the creation of 1,000,000 additional 4 per cent. preference shares of £1 each, and 1,000,000 ordinary shares of £1 each to be issued from time to time as the directors think desirable. The directors also propose that the ordinary and preference shares of the company shall be converted into ordinary and preference stock. An issue of 1,825,000 4 per cent. cumulative preference shares of £1 each was made at 21s. per share in May last, and an additional 175,000 4 per cent. cumulative preference shares were issued in connection with the acquisition of an electricity undertaking adjacent to the company's existing area of supply. The sales of electricity were 776,094,517 kWh as against 693,374,135 kWh in 1933, and in addition 274,741,000 kWh was "exported" to the Central Electricity Board. During the year substantial reductions in charges to consumers were made. The Caterham and Woldingham and District, the Chelmsford and District, and the Saffron Walden Electricity Special Orders, authorising the transfer of the respective undertakings to the company, have received the approval of Parliament. The Electricity Commissioners have consented to the company's application, at the request of the Central Board, to the installation of another 75,000-kW set at Barking power station. During the year the transmission and distribution network was increased by 450 miles of underground mains and overhead lines, whilst 108 additional transforming stations were put into commission. New showrooms and offices have been opened at Mitcham, and the existing showrooms at Romford and Woodford have been extended.

The Kensington & Knightsbridge Electric Lighting Co., Ltd., held its annual meeting on March 7th, when Col. R. E. Crompton (chairman), who presided, said that the revenue account showed a satisfactory increase on the credit side, but on the debit side there was an increase in the sum paid to the London Power Co. for electricity in bulk. Since the beginning of 1934 the generating stations of the London Power Co. had been operated under the direction of the Central Electricity Board, and as a result there had been an increase in price to their company of nearly 6 per cent. This was largely responsible for a decrease in the net profit for the year of nearly £10,000 as compared with 1933. The average price received from the sale of electricity had fallen from 1.65d. in 1933 to 1.58d. in 1934. Sales had increased by nearly 9 per cent. The development of the domestic load had continued, the cooking load having increased during the year by 36 per cent., and the water-heating load by 23 per cent., as compared with the preceding year. Their domestic two-part tariff was growing in popularity, and consumers under this tariff obtained the supply at an average price of 1.2d. per kWh. They had reduced the secondary charge under this tariff to ½d. per kWh as from July 1st, 1934. Referring to the negotiations which had taken place with the other London supply companies with a view to the co-ordination of their resources, he said that while the holding company would have more extensive trading facilities than those now enjoyed by the constituent companies, the bulk of its revenue would still be derived from the supply of electricity by those constituent companies who would continue to operate under their respective statutory orders.

The Metropolitan Electric Supply Co., Ltd., held its annual meeting on March 12th, when Mr. G. Balfour (chairman), who presided, referred to the formation of the holding company for several of the London electricity supply companies adjoining the Westminster Company's area of supply. He thought it was a pity that the proposals should have been proceeded with without definitely providing for physically merging the areas and grouping and amalgamating all the London companies into a small number with compact directorates, commercial and technical administrations. Last March he urged upon the chairman and directors of all the London companies the necessity of consolidating on these lines, and laid before them general proposals to this end. The progress of the company's business last year was much greater than appeared at first sight from the figures presented. The policy of the board for several years had been to make certain that their charges for electricity were such as would induce the widespread use of their services. In the London and Western areas in 1930 they sold, excluding bulk supplies to subsidiaries, 129,320,000 kWh and in 1934 165,832,000 kWh, an increase of 36,512,000 kWh, for which increase they received £24,461, or an increase in receipts from consumers of less than 3 per cent. compared with the increase in sales of nearly 30 per cent. Similarly in the subsidiary companies they had sold about 34,500,000 kWh more in 1934 than in 1930, an increase of nearly 67 per cent., while the increase in the receipts from consumers was about 33 per cent. Last year they maintained their rate of increase in the number of consumers connected, and the total was now 115,416, an increase of 15 per cent.

The Charing Cross Electricity Supply Co., Ltd.—Presiding at the annual meeting held on March 6th, Sir Francis Fladgate (chairman) said that the board had made a reduction in the tariff rates in both the West End and City undertakings, bringing the company's carry forward within the prescribed limits in accordance with the policy outlined last year. The cost of these reduction was estimated to amount to £56,000. The West End lighting rate had been reduced from a maximum of 4½d. to a flat rate of 3½d. per kWh. The City top rate had been reduced from 5d. to 4d. and the bottom rate from 2½d. to 2d.—a reduction of 20 per cent. The rise in costs of both undertakings was mainly due to the increase in the cost of electricity purchased from the London Power Co. This company had incurred considerable capital expenditure in erecting the Battersea power station, which supplied 400,000,000 kWh last year to the Central Electricity Board which had contributed nothing so far towards the capital cost of the production, with the result that the Power Co. had been compelled to supply the Central Board at a heavy loss to itself. This loss was reflected in the increased prices to the constituent companies. Referring to the London Associated Electricity Undertakings, Ltd., he said that this company, by reason of its holdings in the associated companies, would be able to secure all the benefits arising from a centralised control, and at the same time preserve certain of the benefits of local management. The report and accounts were adopted and resolutions were passed for converting the ordinary shares of the company into stock.

The North-Eastern Electric Supply Co., Ltd., reports a profit of £1,088,291 for the year ended December 31st last, as compared with £1,010,748 in 1933. After charging debenture interest, &c., and placing £275,000 to reserve for special depreciation and contingencies other than equalisation of dividends, and £70,000 to reserve for plant renewals and improvements, there is a balance of £518,647, which, with £86,513 brought in, makes £605,160 available. It is proposed to pay a final ordinary dividend of 3½ per cent., maintaining the distribution for the year at 6 per cent., and to carry forward £134,082. The connections to the company's system at the end of the year amounted to 923,393 h.p., as against 867,477 h.p. in the preceding year. The additional capital expenditure amounted to £373,248 and mainly represents extensions to the distribution system. The work of changing over plant from 40 to 50 cycles is proceeding satisfactorily. Notice has been given to certain classes of consumers of reductions in prices of electricity which take effect during the current year. Mr. R. P. Sloan has retired from the managing directorship, but retains his seat on the board. Meeting: March 19th.

The Clyde Valley Electrical Power Co. reports a balance of profit for 1934 of £384,891, as compared with £368,886 in the preceding year, which with £88,287 brought in makes £473,178. A sum of £155,000 is transferred to contingency fund, and it is proposed to pay a final ordinary dividend of 5 per cent., making 8 per cent. for the year (against 7 per cent.). The amount carried forward is £90,700. The report states that the improvement in trade evident in 1933 continued during the year. The number of domestic consumers connected shows a considerable increase. The distribution system has been further developed by an additional 107 miles of cables and overhead lines, fifty-four sub-stations and pole transformer equipments. The company's application to Parliament for authority to extend the area of supply and for other purposes was confirmed by the Clyde Valley Electrical Power Order Confirmation Act, 1934, which received the Royal Assent in July last. Agreements were entered into with the Town Councils of Airdrie and Coatbridge under which the company commenced distributing within these burghs as from October 1st last. Meeting: March 26th at Glasgow.

The City of London Electric Lighting Co., Ltd., reports a net revenue for the year ended December 31st last of £217,407, as compared with £291,749 in the preceding year, and after deducting debenture interest and adding £40,752 brought in there is a balance available of £213,767. The ordinary dividend for the year is maintained at the standard rate of 7 per cent., and it is proposed to distribute a further ½ per cent. on the ordinary

shares out of No. 2 reserve, making a total distribution for the year of 7½ per cent. The report states that substantial reductions in the tariffs were put into force in April last, with the result that the average price obtained per kWh fell to 1.7255d. The abnormally mild weather experienced in the final quarter of the year caused a considerable restriction in consumption, but despite this the total sales show an increase of 3,233,100 kWh or 2.9 per cent. The annual meeting of the company is to be held on March 20th.

Llanelly and District Electric Supply Co., Ltd.—In the course of his speech at last Tuesday's annual meeting, the chairman (Mr. M. A. Edwards) referred to the death of Mr. A. H. Beatty, late chairman, and the appointment of Mr. W. McGill to the vacancy on the board, and also to the death of the secretary, Mr. W. C. Bryden. He said that the company's generating station was now being operated under the direction of the Central Electricity Board. The increase in the amount which they had to pay in rates had made it difficult for them to reduce their charges, but more consumers were taking advantage of the two-part tariff and of the newly instituted instalment-payment wiring system. The sales of electricity had shown a slight decrease due entirely to a diminution in the industrial load; the domestic supplies showed an increase of 25 per cent. The company had carried out important extensions and further development work was in hand.

Ericsson Telephones, Ltd., reports a net profit for 1934 of £84,711, as compared with £68,496 in the preceding year, which with £34,594 brought in makes £119,305. It is proposed to pay a final ordinary dividend of 10 per cent., less tax, plus a bonus of 8 per cent., making 24 per cent., less tax, for the year. This compares with 13½ per cent. for 1933, of which the final dividend of 7½ per cent. was free of tax. Reserve again receives £15,000 and £34,502 is carried forward. The directors state that a substantial increase has been effected in the total turnover. In view of the recent legislation permitting the use of mechanised totalisators on greyhound racecourses, as from July 1st next, it is expected that a satisfactory volume of this business will be secured during the present year. Orders in hand are considerably in excess of last year. Meeting: March 27th.

Waygood-Otis, Ltd.—Presiding at the annual meeting on March 12th Mr. D. W. R. Green (chairman) said the past year had been a particularly busy one. Some of the major contracts obtained included installations for the third section of the Bank of England (sixteen lifts), for the Birmingham Hospital Centre, and the office buildings of the Mersey Tunnel Authority, as well as escalators and lifts for the G.P.O. They also had orders for the Regent Palace Hotel and the Strand Corner House of J. Lyons & Co.; also for the escalators at Waterloo station for the Southern Railway. The liner *Queen Mary* was being equipped with their patent micro machines, and the new building of the Royal Institute of British Architects was provided with their equipment.

The Hendon Electric Supply Co., Ltd.—Presiding at the annual meeting held on March 11th Mr. C. F. Tufnell (chairman) said that the sales of electricity during the past year totalled 33,851,990 kWh, as compared with 31,288,551 kWh in 1933. The revenue per kWh sold was just under 1.6d. This figure had been affected by the removal of their largest power consumer to another part of the country and to other changes which had reduced the demand for industrial power purposes by nearly 1,000,000 kWh. On the other hand, supplies under the domestic two-part tariff increased by nearly 2,500,000 kWh over the 1933 figures. At the end of 1934 they had 32,513 consumers, of whom 10,510 had entered into the domestic tariff arrangement.

The Shropshire, Worcestershire & Staffordshire Electric Power Co. reports a net revenue for 1934 of £679,534, as compared with £577,796 in the preceding year. After deducting debenture interest, &c., placing £168,000 to reserve, and adding £75,883 brought in, there is a total of £340,390 available. The dividend for the year on the "A" ordinary shares is maintained at 8 per cent., while the "B" ordinary shares receive 6 per cent. (against 5 per cent.) on 1,625,000 shares, and 3 per cent. for the half-year on 325,000 shares, leaving £74,140 to be carried forward. Meeting: March 28th.

The Brompton & Kensington Electricity Supply Co., Ltd., reports a balance on net revenue account of £29,607 for 1934, against £38,769 for 1933, which with £10,550 brought in makes £40,157. It is proposed to pay a final ordinary dividend of 3½ per cent., maintaining the standard rate of 7 per cent. for the year, and to carry forward £3,708. The report refers to the formation of the London Associated Electricity Undertakings, Ltd. The sales of electricity increased from 17,072,292 to 17,996,572 kWh, and the number of consumers by 667 to 12,845 Meeting: March 21st.

The Chelsea Electricity Supply Co., Ltd., reports a profit for 1934 of £68,330, which with £8,274 brought in and interest on investments makes £77,734. The final ordinary dividend is 3½ per cent., maintaining the distribution for the year at 7 per cent., and £12,225 is carried forward. The sales of electricity totalled 17,838,789 kWh, an increase of 2,400,565 kWh as compared with 1933. Reference is made in the report to the arrangement with the London Associated Electricity Undertakings, Ltd. Meeting: March 21st.

The West Gloucestershire Power Co., Ltd., reports a balance on revenue account of £51,368 for 1934, as against £46,785 in the previous year. An initial payment of 3 per cent. is made on the participating preference stock, and the surplus of £3,640 is placed to depreciation reserve. The sales of electricity during the year totalled 41,120,219 kWh, as compared with 37,289,727 kWh in 1933. Meeting: March 22nd.

W. Canning & Co., Ltd., report a profit for 1934 of £62,749, as against £52,526 in the preceding year. To this is added £21,381 brought in, making £84,130. Reserve receives £10,000. It is proposed to pay a final ordinary dividend of 5 per cent., plus a bonus of 2s. per share, making 20 per cent. for the year (against 17½ per cent.), and to carry forward a balance of £21,630.

The Scottish Power Co. has announced a final ordinary dividend of 5½ per cent., maintaining the distribution for the year at 8 per cent.

London Associated Electricity Undertakings, Ltd.—We have received from Mr. C. Parker, the joint managing director of this new concern (he was inadvertently described as secretary in our last issue) a statement which says, inter alia, that a sufficient volume of assents and transfers have been received from the shareholders of the six constituent companies to ensure the success of the proposals. It is necessary only to obtain 60 per cent. of consents in order to proceed with the scheme; the figure of 90 per cent. which was first mentioned was fixed to avoid the payment of a substantial stamp duty. The proposals will not disturb the basis of the companies' earning power; economies and co-ordination of effort hold promise of improvement. The complete amalgamation of the companies might involve the promotion of a Bill in Parliament which would cause much delay. The co-ordinated company will not engage in any business that is not at the moment undertaken by each of the constituent companies, but such activities as wiring, the hire and sale of appliances, showrooms and publicity will be under central supervision to increase efficiency in the interests of the shareholders. The costs and expenses of the scheme should be an irreducible minimum.

The British Aluminium Co. reports a profit for 1934, including £52,778 brought in, of £222,970, as against £162,830 in 1933. The ordinary dividend for the year is 7½ per cent. (against 5 per cent.), and £55,375 is carried forward. In June last 500,000 6 per cent. £1 preference shares and 998,966 £1 ordinary shares were issued.

The Greengate and Irwell Rubber Co., Ltd., reports a profit for the year ended December 24th last of £59,938 (against £54,494 for 1933). The final ordinary dividend is 1s. per share on the ordinary 16s. shares, making 1s. 9d. per share for the year (against 1s. 6d.), and £10,763 is carried forward.

Edmundson's Electricity Corporation, Ltd., reports that the results of the operations of its group of companies during February, as compared with the corresponding month of 1934, show an increase of 12 per cent. in kWh sold.

The Isle of Thanet Electric Supply Co., Ltd., reports a profit for 1934 of £54,097. It is proposed to maintain the ordinary dividend at 4 per cent. and to carry forward £2,984. Meeting: March 14th.

The South Metropolitan Electric Light & Power Co., Ltd., has declared a final ordinary dividend of 6 per cent., less tax, making 9 per cent. for the year (same).

The Chiswick Electricity Supply Corporation, Ltd., has declared a final dividend of 6 per cent., actual, less tax, subject to audit, making 11 per cent. for the year (unchanged).

The West London & Provincial Electric & General Trust, Ltd., is paying a final dividend of 2½ per cent. on the 5 per cent. preference shares.

The Canadian General Electric Co. has declared a dividend of 75 cents per share on the common stock for the quarter to March 31st next.

The Mid-Cheshire Electric Supply Co., Ltd., is maintaining its ordinary dividend for 1934 at 8 per cent.

Stocks and Shares

Tuesday Evening.

THE manner in which capital is nowadays moving can be illustrated no better than by reference to the ordinary shares in the best-class London electricity supply undertakings. Last month, the shares in the greater number of the companies were standing about 37s., affording a return at that price of £3 17s. per cent. on the money. To-day the average level is nearer 33s. Of the difference of 4s., about 8d. is accounted for by deduction of the dividend. The yield now available to an investor is rather over 4¼ per cent.

Prices in this market have followed the lead set by British Government and other gilt-edged securities, the falling away in which from the best prices recently attained is due to a variety of causes, partly political, partly financial. There has been no cessation of the accumulation of money, although the owners of the capital are more loath to employ it in Stock Exchange securities than they were earlier in the year. A good many people are asking whether the peak Stock Exchange prices may be considered to have been reached, and whether the present movement is the beginning of a general depreciation likely to continue for some time to come. The answer to the problem must be left to individual opinion, but the fundamental factor in the situation—namely, the plethora of capital—has to be kept steadily in mind. The General Election is not expected in the Stock Exchange to take place until next year.

Electricity Supply Prices

North Metropolitan Electric ordinary shares stand alone in this week's London companies' price-lists as having a rise to their credit. Most of the others are lower. St. James' & Pall Mall shed 2s.: so did Charing Cross. Bromptons are 3s. 6d. down, Westminsters 1s. 6d. Several factors are operating against the securing by the companies of increased profits in the present year. There is, for instance, a quinquennial valuation to be made shortly: experience knows that assessments have a most unpleasant knack of going up. Per contra, the Silver Jubilee celebrations will call for a largely increased consumption of power for illumination and floodlighting purposes.

County Electrics

The County of London Electric Supply Company, in its annual report showing an increase of nearly £150,000 in net revenue, notifies proposals for increasing the authorised capital from 12 million pounds to 14 million pounds. The increase would be divided between a million pounds of 4 per cent.

preference, and the same amount of ordinary shares. The two classes of shares, it is further recommended, shall be converted into stock. The price of the present ordinary shares is 55s. 6d. ex dividend.

Provincial Supply Shares

The Midland Electric Power Corporation for Power Distribution announces a share bonus of one new share for three old shares, and at the same time the company declares a 5 per cent. final dividend, making 8 per cent. for the year. The price is up $\frac{1}{16}$ to $2\frac{2}{16}$. Yorkshire Electrics are easier at 43s. Northamptons have gone back to $2\frac{3}{8}$. The report of the North Eastern Electric Supply Company shows useful progress, and the profits, at £1,088,300, are £78,000 up on the year. The net profits are £35,900 higher. The usual 6 per cent. dividend has been declared. Llanellys, at 23s. 3d., are ex dividend, and rather lower on the week. West Gloucestershire ordinary at 90 has fallen 2 points.

Gilt-edged Stocks

Fixed interest stocks of the various electric boards are inclined to give way. Falls of a point or so have occurred in the issues of the Central Board, London Transport Board, and the West Midlands Joint Authority. The same tendency is noticeable in the debenture and prior charge stocks of the railway companies. Whereas such stocks were extremely difficult to obtain only a month ago, there now seems to be a considerably larger supply available, the buying pressure having been succeeded by willingness to sell on the part of those who are perhaps influenced by the reaction that has overtaken the War Loan and other such gilt-edged securities. Transport "C" has risen superior to adverse influences and, on dividend anticipations, is up to 98. This price, by the way, is about 21 points higher than that of one year ago.

American Utilities

No little dust has been raised in the United States over the controversy in which the American utility companies occupy the centre of the stage. The companies protest at their being made the sport of political parties, which see, in the companies' charges, an opportunity for the manufacture of political capital by those who are always on the look-out for means to conciliate possible voters. The utility corporations have no soul to be saved, but their financial bodies are being damned by the restrictions laid upon their right to charge what they consider fair rates of profit in return for the services they render. Holders of the shares in the companies are, not unnaturally, very indignant at the politicians taking advantage of the position in which utility companies are placed, in order to force the companies to reduce charges until profit is lowered to vanishing point. The controversy, to adopt the terminology of Parliamentary debates, is still proceeding. Meanwhile, some of the hydro-electric companies in Canada are also far from comfortable, owing to the question having been raised as to whether one of the Dominion Governments has the right to grant the concessions, which it has done in the past, to certain companies supplying light and power to various Canadian towns. The uncertainty has led to pronounced dulness in the prices of the stocks and shares in the various companies concerned.

Colonial and Foreign

Brazilian Tractions rose to $9\frac{3}{8}$, but fell back to their previous price of 9. Palestine "A" ordinary shares keep tolerably steady at 11s. 9d. premium. East African Electrics are easier at 32s. 9d. Victoria Falls ordinary have shaken off their recent heaviness, and at $7\frac{3}{8}$ show a gain of 5s.

Cable and Wireless

Cable & Wireless preference is $\frac{1}{2}$ higher, but the two ordinary stocks have gone back, the A losing 15s. at 18. Globe ordinary and preference are quoted ex dividend. The latter shares give a yield of $4\frac{1}{2}$ per cent. at the present price. Marconi Marines at 33s. 9d. are $\frac{1}{16}$ off. Anglo-American Telegraph stocks continue somewhat heavy. American Telephone and Telegraphs are 2 points higher on the week, at 112. International "Tel. and Tel" are not much better than $7\frac{1}{8}$. Telephone Properties are weak at 16s. 6d.; the company operates in Venezuela.

Manufacturing and Equipment

What may be called the heavy shares in the market for cable and manufacturing issues hold their previous prices, British Insulated, Callenders, Enfields and Henleys being all unchanged on the week. International Automatic Telephones, after being 38s. 9d., reacted to 37s. 6d. The "B" deferred shares are 36s. 9d. Telephone Manufacturing shares are a little better at 5s. $1\frac{1}{2}$d. English Electric ordinary and preference recovered 6d. to 6s. 9d. and 12s. 6d. respectively. Ever-Ready are still a jerky market, and at 23s. 6d. show a rise of 1s. on the week. Ericsson Telephone ordinary at $5\frac{3}{4}$ ex dividend are keeping very firm. The company's final dividend of 10 per cent. was supplemented by a bonus of 8 per cent., making 24 per cent. for the year. Last year there was no bonus; of the $13\frac{1}{2}$ per cent. dividend then paid, $7\frac{1}{2}$ per cent. was tax free. The television group has been disposed to dulness, Electric & Musical Industries showing a fall of 6d. at 30s. Baird deferred are 3s. 6d., the preferred 7s., and the "A" $2\frac{3}{8}$. Rubber shares have weakened in sympathy with a decline in the price of the produce.

Share List of Electrical Companies

HOME ELECTRICITY COMPANIES.

	Nom.	Dividend. 1932.	Dividend. 1933.	Price. Mar. 12.	Rise or Fall.	Yield. p.c. £ s. d.
Bournemouth and Poole	1	15	15	77/6	—	3 16 2
Brompton Ordinary	1	7	7	32/6	−3/6	4 6 2
Charing Cross Ordinary	1	7	7	32/6	−2/−	4 6 2
Chelsea	1	7	7	33/−xd.	—	4 4 10
City of London	1	7½	7½	36/−xd.	—	4 3 4
Clyde Valley	1	7	7	42/−xd.	—	3 16 2
County of London	1	10½	10½	55/6xd.	—	3 15 8
Edmundson's 7% Pref.	1	7	7	36/−	−6d.	3 17 8
Elec. Dis. Yorkshire	1	9	9	47/−	—	3 16 8
Elec. Supply Corporation	1	11	11	57/6	—	3 16 5
Kensington Ordinary	1	7	7	33/−xd.	−1/−	4 4 10
Lancs Light and Power	1	7	7½	37/−	—	4 1 1
London Electric	1	7	7	38/6	—	3 12 10
Metropolitan	1	10	10	49/6xd.	−1/6	4 1 0
Midland Counties	1	7	7	35/6 xd.	−1/−	3 19 0
Mid. Elec. Power	1	8	8	51/3	+¼	3 2 6
North Eastern Electric Ordinary	1	6	6	31/6xd.	—	3 16 2
Do. 7% Pref.	1	7	7	34/−xd.	−1/−	4 2 4
Northampton	1	10	10	52/6	−¼	3 16 4
Notting Hill 6% Pref.	10	6	6	14	−½	4 5 9
North Met. Elec. Ordinary	1	10	10	60/9xd.	+1/−	3 5 7
Do. do. 6% Pref.	1	6	6	31/−	−1/−	3 17 5
St. James and Pall Mall	1	7	7½	33/−	−2/−	4 11 0
Scottish Power	1	8	8	41/3	—	3 17 8
South London	1	7	7	36/−	—	3 17 9
Westminster Ordinary	1	7	7	32/6	−1/6	4 6 2
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	26/3xd.	—	5 14 1
Yorkshire Elec.	1	8	8	43/−	−1/6	3 14 5

PUBLIC BOARDS.

		Dividend.				
Central Electricity, 1950–70	Stock	5	5	115	−1	4 7 2
Do. 1955–75	„	5	5	118	—	4 4 9
Do. 1951–73	„	4½	4½	111	−1	4 1 1
Do. 1963–93	„	—	3½	101	−½	3 9 6
London & Home Counties, 1955–75	„	4½	4½	114	—	3 19 0
London Passenger Transport, A	„	—	4½	121½	—	3 14 0
Do. do. B	„	—	5	123½	−1	4 1 0
Do. do. C	„	—	3	98	+1	3 1 3
West Midlands Joint Elec. 1948–68	„	—	5	116	−2	4 6 2

TELEGRAPH AND TELEPHONE.

		Dividend.				
American Tel. & Tel.	$100	9	9	112	+2	8 0 8
Anglo-Am. Tel. Pref.	Stock	6	6	120½	−1	4 19 7
Do. Def.	„	1½	1½	28	—	5 7 2
Cable & Wireless 5½% Pref.	„	2¾	2¾	85	+½	3 4 8
Do. A. 7½% Ord.	„	Nil	Nil	18	−¾	—
Do. B. Ord.	„	Nil	Nil	6½	−½	—
Globe Tel. & Tel. Ord.	10	Nil	2½	11½xd.	−9/−	2 4 7
Do. do. Pref.	10	6	6	13½	−½	4 10 7
Great Northern Tel.	10	20	20	39½	—	5 1 3
Marconi-Marine	1	10	7½	33/9	−1/3	4 9 0
Oriental Telephone Ord.	1	12	12	3⅛	—	*3 12 5

HOME AND FOREIGN TRAMS, ETC.

		Dividend.				
Anglo-Arg. Trams First Pref.	5	Nil	Nil	2/−	—	—
Do. do. 2nd Pref.	5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	5	—	—
British Electric Traction Df. Ord.	„	5	5	915	—	—
Do. do. Pref. Ord.	„	8	8	168½	−4	4 14 9
Brazil Traction	100	—	—	9	—	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	102½	+2	4 17 6
Mexican Light Common	100	Nil	Nil	2½	—	—
Do. 7% Pref.	100	7	7	4½	—	—
Do. 1st Bonds	$500	5	5	40	−4½	—
Victoria Falls Ord.	1	15	20	7⅜	+⅛	2 14 0
Yorkshire (West Riding)	1	2½	5	28/9xd.	+1/−	3 9 9

MANUFACTURING COMPANIES.

		Dividend.				
Aron Electricity Ord.	1	10	10	66/3	—	3 3 3
Assoc. Elec. Ord.	1	4	3	26/−	+1/−	2 6 0
Do. Prf.	1	8	8	37/−	−6d.	4 6 4
Babcock & Wilcox	1	9	6	44/−	−6d.	2 14 7
British Aluminium Ord.	1	5	5	31/3	−9d.	3 4 0
British Insulated Ord.	1	5	15	76/3	—	3 18 9
Brush Ord.	Stock	Nil	Nil	40½	—	—
Callender's	1	15	15	3½	—	4 5 9
Do. 6½% Pref.	1	6½	6½	32/6	—	4 0 0
Crompton Parkinson Ord.	5/−	22	12½	35/6	—	1 15 0
Do. 8% Pref.	1	8	8	35/−	—	4 11 5
Edison-Swan 1st Pref.	1	7½	7½	23/9	—	6 6 4
Electric Construction	1	Nil	Nil	15/−	—	—
Enfield Cable Ord.	1	25	20	4½	—	5 2 6
English Electric	1	Nil	Nil	6/9	+6d.	—
Do. do. Pref.	1	Nil	Nil	12/6	+6d.	—
Ever Ready	5/−	35	35	23/6	+1/−	7 9 0
Ferranti Pref.	1	7	7	29/6	—	4 15 0
G.E.C. Pref.	1	6½	6½	32/−	−1/9	4 1 3
Do. Ord.	1	8	8	48/3	−6d.	3 6 7
Henley's	1	30	30	6¾	—	4 8 0
Do. 4½% Pref.	5	4½	4½	5¾	—	3 16 8
India-Rubber Preferred	1	—	—	1¼	—	—
Johnson & Phillips	1	5	5	28/3	—	3 10 8
Siemens Ord.	1	6½	4	1	—	4 0 0
Telegraph Construction	£1	Nil	Nil	1	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parenthesis are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1933

15119. "Four-terminal electrical networks." C. M. Gewertz. May 5th, 1932. (423924.)

19544. "Train lighting, heating, and like installations." J. Stone & Co., Ltd., and A. H. Chilton. July 10th, 1933. (424126.)

19545. "Electromagnetic switches for train lighting, heating and like installations." J. Stone & Co., Ltd., and A. H. Chilton. July 10th, 1933. (424127.)

19547. "Electric switching devices for train lighting, heating and like installations." J. Stone & Co., Ltd., and L. R. Nixon. July 10th, 1933. (424128.)

19748. "Television and like receivers." Marconi's Wireless Telegraph Co., Ltd., H. M. Dowsett and N. Levin. July 12th, 1933. (424196.)

21653. "Electron-discharge devices." Electric & Musical Industries, Ltd., I. Shoenberg, C. S. Bull and S. Rodda. August 2nd, 1933. (Cognate applications 21654/33, 21655/33 and 13169/34.) (423932.)

22008. "Method of producing magnetic material in the form of thin wires or ribbons, especially for the loading of communication lines." Siemens & Halske Akt.-Ges. August 8th, 1932. (Addition to 408984.) (424131.)

22200. "Method of producing thin wires or ribbons of magnetic material, especially for the loading of communication lines." Siemens & Halske Akt.-Ges. August 11th, 1932. (Addition to 29281/32.) (424001.)

22212. "Low-pressure vapour apparatus for electric discharges." Elin Akt.-Ges. für Electrische Industrie. June 26th, 1933. (423937.)

22281. "Selective detection of radio signals." Radio Frequency Laboratories, Inc. September 14th, 1932. (424197.)

22411. "Automatic railway-signalling systems." Vereinigte Eisenbahn-Signal-Werke Ges. August 29th, 1932. (423941.)

22548. "Television or like systems." J. C. Wilson and Baird Television, Ltd. August 12th, 1933. (424199.)

22699. "Speed control of electric motors." British Thomson-Houston Co., Ltd., and B. Atkins. August 14th, 1933. (424005.)

22803. "Gaseous electric discharge lamps." British Thomson-Houston Co., Ltd., L. J. Davies and W. J. Scott. August 15th, 1933. (424203.)

22806. "Systems of electric motor control." British Thomson-Houston Co., Ltd., and B. Adkins. August 15th, 1913. (424136.)

23364. "Electric discharge lamps." A. H. Stevens (National Television Corporation.) August 22nd, 1933. (424211.)

24020. "Busbars for electrical switchboards." W. G. W. Shaw. August 30th, 1933. (424215.)

24622. "Protective systems for sectionalised electric supply networks." T. W. Ross and Associated Electrical Industries, Ltd. September 5th, 1933. (423955.)

25242. "Thermally-operated electric switches." British Thomson-Houston Company, Ltd. September 12th, 1932. (424014.)

26208. "Switch devices for electric incandescent lamps, particularly battery lamps." Rayner & Keeler, Ltd., and J. Pike. September 22nd, 1933. (423957.)

26210. "Electric batteries." Siemens Bros. & Co., Ltd., and C. R. Riber. September 22nd, 1933. (423958.)

26211. "Electrical junction and distribution boxes." Siemens Bros. & Co., Ltd., and C. E. Rose. September 22nd, 1933. (Cognate application 15900/34.) (424070.)

26702. "Control of sources of illumination in kinematograph projectors." Dr. O. K. Kolb. September 28th, 1933. (424220.)

27200. "Television and the like transmission systems." Electric & Musical Industries, Ltd., M. Bowman-Manifold, and W. S. Percival. October 3rd, 1933. (Addition to 401990.) (424221.)

27764. "Electrically operated thermal devices for closing and opening electric circuits." Siemens Bros. & Co., Ltd., and F. J. Gee. October 9th, 1933. (424222.)

28163. "Controlling system for electrically operated lifts." General Electric Co., Ltd., and A. A. Chubb. October 12th, 1933. (424075.)

28848. "Arrangements employing electric discharge devices for connecting a load to a supply." British Thomson-Houston Co., Ltd. October 22nd, 1932. (424022.)

29826. "Single-tube modulated oscillator." W. F. Brown. October 27th, 1933. (Cognate application 32425/33.) (423961.)

31143. "Time-base circuits for cathode-ray oscillographs for use, for example, in television apparatus." General Electric Co., Ltd., and C. R. Dunham. (November 8th, 1933. (423963.)

31900. "Rotary transformers for direct electric current and apparatus for use therewith." G. M. Pestarini. November 15th, 1933. (424082.)

32071. "Separators for storage batteries and process for their manufacture." M. Pagenel. October 4th, 1933. (423964.)

33208. "Electricity meters." H. V. Harwood and Associated Electrical Industries, Ltd. November 27th, 1933. (423967.)

33210. "Thermionic valves."" E. Y. Robinson and Associated Electrical Industries, Ltd. November 27th, 1933. (423968.)

1934

2190. "Cathode-ray oscillographs for use in television." General Electric Co., Ltd., and L. C. Jesty. January 22nd, 1934. (424093.)

3400. "Electromagnetically actuated compressors." A Tebes Maschinen und Armaturen Fabrik Ges., and W. König. February 1, 1934. (Addition to 392811.) (424095.)

6080. "Electric switches operative alternately on and off by successive reciprocations of a control member." E. Bolton. February 24th, 1934. (424100.)

6171. "Means for protecting vapour ion valves against undesired arcs." Allmänna Svenska Elektriska Aktiebolaget. March 1st, 1933. (423974.)

8388. "Closures of electric batteries, cells, and the like." T. Stretton and Concordia Electric Safety Lamp Co., Ltd. March 16th, 1934. (424102.)

9476. "Thermionic valves and arrangements in which such valves are used." C. A. S. Jensen. March 28th, 1933. (424035.)

12061. "Electric transformers." Naamlooze Vennootschap Philips' Gloeilampenfabrien. May 17th, 1933. (424108.)

14090. "Electric starting systems for incandescent ignition internal combustion engines, particularly heavy-oil engines." R. Bosch Akt.-Ges. May 31st, 1933. (424151.)

16252. "Duplex radio aerial systems." Amy, Aceves & King, Inc. December 22nd, 1933. (424239.)

16305. "Thermionic valves." Siemens & Halske Akt.-Ges. May 31st, 1933. (424111).

16642. "Train lighting, heating, and like installations." J. Stone & Co., Ltd., and A. H. Chilton. July 10th, 1933 (Divided out of 424126.) (424156.)

18681. "Oscillatory armature electromotor." Landis & Gyr Akt.-Ges. July 13th, 1933. (424044.)

19210. "Variable directional aerial." A. W. Mann. June 29th, 1934. (424118.)

22189. "Installations comprising one or more electric discharge tubes having a vapour filling." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. September 29th, 1933. (423989.)

22191. "Thermionic generators." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. September 6th, 1933. (423990.)

22478. "Manufacture of dynamo-electric machine coils." J. W. Swendsen. August 1st, 1934. (424119.)

25014. "Dynamo-electric machines." British Thomson-Houston Co., Ltd. August 30th, 1933. (424169.)

27850. "Electric-lighting installations." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. September 30th, 1933. (Addition to 389025.) (424175.)

28913. "Manufacture of permanent magnets." British Thomson-Houston Co., Ltd. October 10th, 1933. (423994.)

30630. "Thermionic-valve circuits." British Thomson-Houston Co., Ltd. October 27th, 1933. (423995.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from March 6th.

Aclux. No. 557409. Class 4. Carbons for electrical purposes. —Charles H. Champion & Co., Ltd., 60-66, Wardour Street, W.1.

Zeda. No. 556398. Class 13. Electric irons.—Z Electric Lamps & Supplies, Zeda House, 21, Newman Street, W.1.

Decora. No. 556698. Class 13. Electric incandescent lamps (ordinary).—Metropolitan-Vickers Electrical Co., Ltd., Bush House, Aldwych, W.C.2.

Titrode. No. 557248. Class 13. Electrodes of ordinary metal. —Titanium & Rare Metals, Ltd., 19, Southampton Buildings, Chancery Lane, W.C.2.

I.E.E. North Midland Dinner

THE annual dinner of the North Midland Centre of the Institution of Electrical Engineers took place on March 8th, at the Hotel Metropole, Leeds, when Prof. E. L. E. Wheatcroft (chairman) presided, and in proposing the health of the president of the Institution devoted his remarks largely to the educational and training side of young men for the electrical industry and expressed appreciation of the important part which the Institution was taking in such developments. He suggested that schoolboys desiring to become electrical engineers might be interviewed by men already in the profession, who could discover whether they were really suitable youths; and that when lads were admitted as suitable it would be helpful if, by the co-operation of firms, they could be given a year's training on the practical side before going through a college or university course.

Prof. W. M. Thornton, in the course of his response to the toast, emphasised the value to electrical students of free access to libraries in all areas. Mr. W. B. Woodhouse, general manager of the Yorkshire Electric Power Co., proposing the health of the guests, said they were glad to see how the steel industry was determined to break all records in its use of electricity and that the Yorkshire woollen industry was rapidly using more electrical power. The colliery industry, despite great adversity, continued to increase the number of its electric motors, and nobody had more reason than electrical people to wish the colliery industry a speedy and adequate return for its endeavours.

Mr. J. M. Kennedy, Electricity Commissioner, who replied on behalf of the guests, said that he firmly believed in the desirability of electrifying the main-line railways and from an atmospheric and health standpoint anybody could realise the importance of it by a glance at a big railway station area like Leeds. The country had lately been engaged on tremendous housing developments and had a huge housing programme during the next four or five years. This meant an enormous potential domestic load and he hoped the industry, by way of more standardised charges, would capture that load. The chairman's health was proposed by Mr. P. F. Rowell, secretary of the Institution, and his remarks were briefly responded to by Prof. Wheatcroft.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Abbots Langley.—Houses (1,280), Ridgehurst Estate; Watford Ideal Homes, Ltd.

Aberdeen.—Cinema (2,800 sets), Union Street; T. Scott, architect, 10, Albyn Place.

Alnwick.—Houses (80); Liddell & Son, builders, Forest Hall, Newcastle-on-Tyne.

Ashton-in-Makerfield.—Houses (46), Brockstedes site; U.D.C. surveyor.

Barking.—Elementary school, Sandringham Road; Dawson & Allardyce, architects, Clock House Chambers.

Barrow-in-Furness.—Houses (24), Gloucester Street; H. E. Tyson.

Beckenham.—School (800 places), Coney Hall, for E.C.; director of education.

Bellshill (LANARKSHIRE).—Houses, Dean Street, and Bothwell Park, for C.C.; J. Stewart, county architect, 20, Albert Street, Motherwell.

Biggleswade.—Houses (28), for the R.D.C.; F. C. Levitt, architect, Market Square.

Billingham.—Houses (126), Cowpen Lane; housing architect.

Birkenhead.—Junior school (700 places), Prenton, for Borough E.C.; director of education.

Blackburn.—Senior school, Shorrock Lane (£16,000), for Borough E.C.; director of education.

Blackpool.—Houses (466), Newton Drive; A. Wilson. Hotel, Queen's Drive, Bispham; Sir L. Parkinson & Co., Ltd.

Blyth.—Houses (124), Hodgsons Lane; borough engineer.

Bolton.—Houses (126), Willows Lane; borough engineer. Extensions to works, Bridgman Street; J. Walmsley & Sons.

Bootle.—Houses (120), Harris Drive; H. Carr.

Brierley Hill.—Houses (84); R. H. J. Comber, surveyor, Albion Street.

Bristol.—School, Ilminster Avenue (£23,952); E. A. W. Poole & Son. Secondary school, Novers Hill (£64,681); W. Cowlin & Son, Ltd.

Cannock.—Houses (27); U.D.C. surveyor.

Cardiff.—Houses (104), Sloper Road; city engineer.

Carlisle.—New St. Barnabas Church; Rev. C. M. L. Bouch, vicar. Estate development of Knowefield; H. E. Scarborough, architect.

Chertsey.—Houses (370), Ottershaw Park Investment Co. Houses (80), Addlestone, for A. W. Sheppard.

Cheshire.—School (400 places), Ashton-upon-Mersey, for County E.C.; director of education, Chester. Schools, Hartford (£40,320), and Blacon, for County E.C.; F. A. Browne, county architect, Chester.

Chesterfield.—Houses (80), Corporation estates; C. Bond, architect, and Rollinson & Son, architects.

Chester-le-Street.—Cinema, Birtley; J. W. Corking, architect, 16, West Street, Gateshead-on-Tyne.

Chippenham.—Houses (50), Langley Road and Greenway Lane; Taylor & Woodrow, Ltd.

Consbrough.—Houses (100), by direct labour; U.D.C. surveyor.

Coventry.—Electrical fittings for Technical College, for E.C.; F. H. Harrod, director of education.

Dagenham.—Town hall and fire station (£110,865); U.D.C. surveyor.

Darenth (KENT).—Modernisation of Training Colony (£301,300); L.C.C. architect.

Darlington.—Houses (62); W. F. Hartley, builder, Banktop Sawmills.

Derbyshire.—School, Tideswell, for County E.C.; G. H. Widdows, county architect, Derby.

Douglas (I.O.M.).—Electric lighting of offices, for the Board of Guardians; W. H. Taggart, clerk, 3, Harris Terrace.

Durham.—School, Hamsterley, for County E.C.; F. Willey, architect, 34, Old Elvet.

Edinburgh.—College and clinic, Niddrie Mains Terrace, for the University Settlement Association; R. R. Grieve, architect, 16, Royal Circus.

Enfield.—Houses (35), Churchbury Lane; F. Elmore Jones. Houses (38), Onslow Gardens; G. W. Newman. Extensions to Suffolk School (£24,500), for E.C.

Fareham.—Houses, Portchester; U.D.C. surveyor.

Felling-on-Tyne.—R.C. senior school; R. Burke, architect, 12, Grey Street, Newcastle-on-Tyne.

Gateshead-on-Tyne.—Houses (260); F. H. Patterson, borough engineer. Cinema, Low Fell, for Smelts Theatres, Ltd.; E. M. Lawson, architect, 19, Ridley Place, Newcastle-on-Tyne.

Glasgow.—Houses, Househillwood, and Springburn; director of housing. Employment Exchange, Cambuslang; architect, H.M. Office of Works, 122, George Street, Edinburgh.

Harrow.—Hotel and assembly hall, Rayners Lane, for Truman, Hanbury, Buxton & Co. (£30,000).

Hastings.—Alterations and additions to St. Leonards-on-Sea Pier, for Southern Piers, Ltd.; Geo. Coles, architect.

Hayes (KENT).—Cinema, for General Cinema Theatres, Ltd., Southampton Buildings, London, W.C.1.

Helston (CORNWALL).—Houses (24), Porthleven; W. J. Crute, U.D.C. surveyor.

Hinckley.—Extensions to factory, Burbage, for the Iway Hosiery Co., Ltd.; H. H. Simmonds, builder, Hawley Road, Hinckley.

Hoyland (YORKS).—Houses (50); U.D.C. surveyor.

Ilford.—Houses (28), Forest Road; Haines & Warwick, Ltd. Houses (32), Galsworthy Avenue; P. Triplete, Ltd. Houses (350), Rushden Gardens, &c.; New Ideal Homesteads, Ltd. Houses (25), Willnet Gardens, &c.; G. F. Seigerts. Showrooms and shops, High Road, Goodmayes; F. G. Smith (Motors), Ltd.

Irvine.—Houses (100); W. L. Weir, burgh surveyor, Burgh Chambers.

Lancashire.—Technical college, Stretford, for County E.C. Clinic and school Centre, Walton-le-Dale. Senior school, Droylsden, and extensions to Poor Law Institution, Whiston (£31,000); county architect, Preston.

Leeds.—Houses (250), clearance areas; city architect. Church, Foundry Lane; Leeds Church Forward Movement.

Lewes.—Mineral water factory; E. H. Fuller, architect, High Street.

Liverpool.—Cinema, Prescot Road, Old Swan, for Bedford Cinemas (1928), Ltd.; E. Shennan, F.R.I.A.A., architect, North John Street, Liverpool.

Manchester.—Factory, Lower Crumpsall, for James Howarth, Ltd.; Roberts, Wood & Elder, architects, 26, Queen Street.

Mexborough.—Post Office and telephone exchange, High Street, for H.M. Office of Works; J. Grey West, chief architect, Storey's Gate, London, S.W.1.

Middlesbrough.—Houses, Stockton Road, North Ormesby; Stephen Coates, Ltd., builders, Langbourgh Place, North Ormesby.

Newbiggin (NORTHUMBERLAND).—Houses (70); H. Wardhaugh, builders, Whitley Bay.

Newburn-on-Tyne.—Houses (46); J. H. Weatherley, U.D.C. surveyor.

North Riding.—Courthouse and police headquarters, Northallerton (£31,000), for C.C.; county architect, Northallerton.

North Shields.—Houses (24), Howden Road, for the Square Building Trust, Northumberland Square.

Nottingham.—Factory, Beeston, for Boots Pure Drug Co. (£550,000), with electrical work; Sir E. Owen Williams, architect, Nottingham.

Oldham.—High school for Borough E.C.; director of education.

Perth.—Indoor skating and curling rink (£20,000); secretary, Perth and District Curling Province.

Plymouth.—Houses (32), Prince Maurice Estate; W. Jinkin. Baths, Central Park (£40,000); city engineer. Development of Moor Farm Estate; Body & Sons. Extensions to printing works, Frankfort Lane, for the Western Morning News.

Ponders End.—Houses (28), Alma Road; Melhuish & Henson.

Preston.—Business stores, Fishergate, for British Home Stores, Ltd., Newgate Street, London, E.C.1.

Richmond (SURREY).—Houses (92), Ham; borough engineer.

Rochester.—Senior school (£25,137), for City E.C.; J. A. Davison & Son, builders, High Street, West Malling.

Rotherham.—Houses (300), Herringthorpe Estate; borough engineer. Houses (22), Wortley Road; H. Fenn. Schools, East Dene housing estate, for R.C. managers; priest-in-charge.

Rustington (SUSSEX).—Club premises, Broadmark Estate (£40,000); A. T. W. Goldsmith, architect, Worthing.

Scarborough.—School, Northstead Estate; borough engineer.

Seaton.—Church, Manor Road; R.C. authorities.

Seghill.—Houses (100); E. Furlong, surveyor.

Sheerness.—Cinema, Strode Crescent; Council's surveyor.

Sileby.—Extensions (five new bays) to factory, Brook Street, for Newbold and Burton, Ltd.; J. E. Souter, Leicester Road, Syston, Leicester.

Stalybridge.—Houses (54), clearance areas; borough engineer. Employment exchange, Mottram Road, for H.M. Office of Works.

Stockport.—Extensions of buildings for the Stockport Infirmary, Wellington Road, South Stockport (£35,000); Thomas Worthington & Sons, architects, 178, Oxford Road, Manchester.

Stockton-on-Tees.—Senior school, Newham Grange, for E.C.; G. Dougill & Sons, builders, Chestnut Street, Darlington.

Stoke-on-Trent.—Extensions to London Road Hospital, including operating theatre and administrative block (£500,000); city surveyor.

Stourbridge.—Houses (24), Lye; Housing, Ltd., builders, Blackheath, London, S.E.3.

Stretford.—Houses (25), Bruton Avenue; E. Jackson & Sons, Ltd. Extension to factory, Park Road; D. Anderson & Son, Ltd. Extension to works, Westinghouse Road; Southern Oil Co., Ltd.

Sunderland.—Houses (44), Utterdipe Estate; J. Lewis, borough engineer.

Surbiton.—Houses (82); J. J. Hodgson & Sons, Ltd., builders.

Swindon.—Extensions to factory, Colborne Road, for the Imperial Tobacco Co., Ltd.

Torquay.—Houses (100), Windmill Hill; borough engineer.

Tredegar.—Houses (40); U.D.C. surveyor.

Twickenham.—Development of Cole Estate, Great Chertsey Street; John Turner & Sons (Preston), Ltd. Houses, Forty Acre Field; borough surveyor.

Tyldesley.—Houses (150), Astley; F. E. Jones, surveyor, Town Hall.

Uttoxeter.—Houses (81), Slade Lane; U.D.C. surveyor.

Wakefield.—Houses (200), various sites; P. Morris, housing architect, Town Hall. Cinema and shops, Kirkgate and Sun Lane, for Associated British Cinemas, Ltd.; W. R. Glen. Art school, Newstead Road; city engineer. Alterations to Technical College and Newstead Road Centre, for E.C.

Walsall.—Houses (42), Fullbrook Estate; G. Insley, Ltd.

Warwickshire.—Senior school (700 places), Stratford-on-Avon, for County E.C.; director of education, Warwick.

West Bromwich.—Elementary school, Friar Park Estate, electrical work; A. C. Chatterley, architect, 41, Water Street, Birmingham.

West Sussex.—Senior schools, Shoreham-by-Sea (£20,990), and Bognor Regis; county architect, Chichester.

Wolverhampton.—Houses (29), Pinfold Lane; L. T. Taylor. Houses (182), Estate, Showell Road; Manley & Regulus, Ltd. Houses (33), Warstones Road; A. & J. Mucklow. Houses (32) and shops, Fallings Park; M. A. Boswell. Factory, Ettingshall Road; Morris Springs, Ltd.

Worthing.—Bathing pool, &c. (£60,000); borough surveyor.

Yeovil.—School, Summerleaze Park, for E.C.